The NEEDNT Foods Moderation Guidelines:
Pre-testing of preliminary Moderation Guidelines for the NEEDNT Food List

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A thesis submitted in partial fulfilment of the requirements for the Degree of Master of Dietetics

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Dunedin, New Zealand

June 2015
Abstract

**Background:** Obesity is a key modifiable risk factor for non-communicable diseases. The modern food environment provides easy access to inexpensive, highly palatable, energy-dense and nutrient-poor foods and beverages, which are associated with increased BMI and reduced dietary quality. The NEEDNT Food List™, comprising ‘non-essential, energy-dense, nutritionally-deficient’ foods and beverages, was developed to help patients and consumers to clearly distinguish non-essential foods from core foods required for good health. In the present study, the original NEEDNT Food List™ was incorporated into preliminary ‘Moderation Guidelines’, which aim to provide quantified guidance for implementing the concept of dietary moderation, in the context of NEEDNT food and beverage intake.

**Objectives:** The aims of the present study were to create a points and quota system for quantifying and monitoring energy intake from NEEDNT foods and beverages; to pre-test preliminary Moderation Guidelines among a representative group of potential users; and to make recommendations to further develop the Moderation Guidelines as a weight loss tool.

**Design:** This study utilised an observational design and qualitative methods to obtain information-rich verbal data from study participants. Twelve people, aged 22 to 57 years, with a BMI ≥30 and a history of repeated weight loss attempts, were selected to pre-test the Moderation Guidelines over a 4-week period, and subsequently participated in one-on-one, semi-structured interviews. Interviews comprised eight open-ended questions, to explore participants’ views and experiences of the Moderation Guidelines, along with information relating to historical weight loss attempts and thoughts on dietary moderation. Interview data were recorded, transcribed verbatim and coded using NVivo software. Coded data were categorised and evaluated by thematic analysis using a general inductive approach.

**Results:** Preliminary NEEDNT Foods Moderation Guidelines were presented in an A5 booklet format, with NEEDNT foods and beverages assigned 1 NEF (‘non-essential food’ value) per
100 kcal portion. Participants were allocated up to 19 NEFs weekly, representing around 1900 kcal. Participants varied in the extent of their previous dieting experiences. All expressed uncertainty around applying personal concepts of dietary moderation. Nine participants found the Moderation Guidelines usable and beneficial. Five participants self-reported weight losses of 2-4 kg during the 4-week period. Three participants found the Moderation Guidelines less appealing, unusable, or incomplete. All participants reported an improved understanding of dietary moderation generally. Seven participants intended to continue using the Moderation Guidelines. Suggested changes to the print booklet included revision of NEEDNT food and beverage categories, modification of terminology, integration of colour and graphics, clarification of serving sizes, and culture-specific versions. Most participants emphasised the need for support from a Dietitian or other health professional, for dietary guidance around core food groups, and behavioural change techniques. Participants said a NEEDNT-based smartphone app would increase functionality and appeal. Māori and Pacific participants requested culturally tailored NEEDNT-based education.

**Conclusion**: Preliminary NEEDNT Foods Moderation Guidelines show potential for assisting obese persons to lose weight by moderating consumption of NEEDNT foods and beverages. Revision and retesting would further develop the Moderation Guidelines, and should incorporate participants’ recommendations, design principles, behavioural change theories, and best practices in nutrition education. An intervention trial is warranted, to evaluate the effectiveness of revised Moderation Guidelines as a dietary quality and weight loss tool. Further research opportunities include the development of a Moderation Guidelines smartphone app and website, tailored adaptation of the Moderation Guidelines for Māori and Pacific individuals and community groups, and a NEEDNT-based public health campaign.

**Keywords**: NEEDNT Food List, NEEDNT Foods Moderation Guidelines, Moderation Guidelines, NEF, NEEDNT-FFQ, dietary moderation, energy density, nutrient density, overweight, obesity, qualitative research, qualitative evaluation, nutrition education.
Preface

This study was supervised by Dr Jane L. Elmslie (Clinical Senior Lecturer, Department of Psychological Medicine, University of Otago, Christchurch and Clinical Leader of Dietetics, Specialist Mental Health Services, Canterbury District Health Board) and co-supervised by Dr Ria N. Schroder (Research Fellow, National Addiction Centre, Department of Psychological Medicine, University of Otago, Christchurch).

The present study is a continuation of ‘The NEEDNT Food List: non-essential, energy-dense, nutritionally-deficient foods’, developed and published by Dr Jane L. Elmslie, Dr J. Douglas Sellman, Dr Ria N. Schroder and Dr Frances A. Carter (Department of Psychological Medicine, University of Otago Christchurch). The NEEDNT Food List™ was developed for medical practitioners and other health professionals working with overweight and obese individuals wanting to lose weight. The present study involved incorporating the NEEDNT Food List™ into quantified ‘Moderation Guidelines’ and presenting them in a print resource suitable for the lay public. Preliminary NEEDNT Foods Moderation Guidelines were qualitatively evaluated, to assess their usability and acceptability, among a group of potential future users.

The candidate, Renée Graham, was responsible for:

- The study design, completion and submission of ‘Category A’ Ethical Approval, and Māori Consultation (with Dr Jane Elmslie and Dr Ria Schroder).
- Completion of study documentation based upon templates provided by Dr Jane Elmslie and Dr Ria Schroder, including: Study Protocol, Participant Information Sheet, Consent Form, Study Advertisement, Locality Assessment, Self-Screening Form, Eligibility Criteria, and Ethnicity Form.
- Acting as sole Study Coordinator and contact person for (potential and selected) participants throughout the study process, via phone, text messaging, email, and in-person communications.
• Advertisement, recruitment, screening, and selection of study participants.

• The development and design of the NEEDNT Foods Moderation Guidelines booklet, including background data calculations using Kai-culator™ Dietary Assessment Software (with guidance from Dr Jane Elmslie, Liz Fleming, Dr Claire Smith, and Dr Rachel Brown, and input from fellow MDiet students).

• Development of the Interview Questionnaire Template, with guidance from Dr Ria Schroder, and pilot-testing assistance from fellow MDiet students.

• Conducting one-on-one interviews with study participants and crosschecking transcribed interview recordings for data accuracy.

• Maintaining secure storage (and subsequent permanent deletion/destruction) of all personal information and data pertaining to (potential and selected) study participants.

• Analysis of interview data using NVivo10 Qualitative Data Analysis Software.

• Collation and provision of participant packs including standardised New Zealand metric cup and spoon sets, and the NEEDNT Foods Moderation Guidelines print booklet.

• Completion of thesis research and write-up as per MDiet requirements (with clinical and research input and supervision from Dr Jane Elmslie and Dr Ria Schroder).

Please note, two other MDiet students each conducted separate, concurrent research, which relate to the NEEDNT Food List™ and the NEEDNT Foods Moderation Guidelines:


Dedication

For my parents, Bruce and Susan Graham –
All of my life I have wanted to make you proud,
All of my life I have known that you already are.

We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time.
Through the unknown, remembered gate
When the last of earth left to discover
Is that which was the beginning;
At the source of the longest river
The voice of the hidden waterfall
And the children in the apple-tree
Not known, because not looked for
But heard, half heard, in the stillness
Between the two waves of the sea.
Quick now, here, now, always--
A condition of complete simplicity
(Costing not less than everything)
And all shall be well and
All manner of things shall be well
When the tongues of flame are in-folded
Into the crowned knot of fire
And the fire and the rose are one.

_Little Gidding V, Four Quartets._
_T.S. Eliot (1943)_
I would like to thank the following people for their invaluable contributions –

Firstly, two incredible women whose knowledge and passion I hope to emulate in my own career, my clinical and academic supervisor Dr Jane L. Elmslie and my academic co-supervisor Dr Ria N. Schroder. Jane and Ria, this thesis journey has been an undulating ultra-marathon, and I can’t adequately express my gratitude, for your clinical and research expertise, your ongoing guidance and friendship, and your graciousness in allowing me to find my own project via my own pathway. Thank you.

My family, Dad, Mum, Emma, Kate, and Cameron, for a lifetime of love and belonging.

My twelve wonderful participants, for sharing your experiences with such refreshing humility and candour. Your incredible contributions are the very soul of this thesis.

My beautiful friends, Joanne (Pukeko) Lee and Craig (Willis) Hall for being my home away from home. Me te mihi nui mō ā kōrua manaakitanga.

My gal Heather Purnell, a fellow master (of physiology and fabulousness) and a soul-nourishing constant in my life.

Two very special flatmates, who right from the start, were always on Team-Renée – my favourite Yankee Botanist Dana Dudle and my big little bro Caleb Jones. Some friendships are fleeting, yet their impact lasts a lifetime.

My remarkable dietetic classmate, Amy Lowry, Melanie Orchard, and Sarah Firman, for always boosting me up, and at times, carrying me along.

Dr Rachel Brown, Liz Fleming and Dr Claire Smith, for your much appreciated guidance in the early stages of my project; Professor Jim Mann, for your wise and timely counsel in the mid-stages; Dr Julie Weaver and Lyn Tyrrell for your impeccable admin support throughout; and Sandi Jull, for being my ITS superwoman right through to the bittersweet end.

And the many people who contributed, in a personal or professional capacity, to my clinical dietetic training and master’s thesis years, via teaching or supervision, practical support, specialist expertise, moral sustenance or valuable miscellaneous time. None of it went unnoticed.

But most of all, I’d like to thank my husband Daniel O’Flaherty – my research assistant, financial backer, No. 1 confidant, and biggest fan – for being resolutely by my side these 17 years and counting, throughout my personal struggles to find balance and peace in the complexities of food, eating, weight, body image and self, and my on-going searches for a greater meaning and purpose in life. This was never really about getting a Master’s Degree in Dietetics. But you’ve always understood this, my dear, exquisite love.
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<td>App</td>
<td>Application</td>
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<tr>
<td>BMI</td>
<td>Body Mass Index</td>
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<td>BW</td>
<td>Body Weight</td>
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<td>CNPP</td>
<td>Centre for Nutrition Policy and Promotion</td>
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<td>CVD</td>
<td>Cardiovascular Disease</td>
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<td>DAA</td>
<td>Dietetics Association of Australia</td>
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<td>DASH</td>
<td>Dietary Approaches to Stop Hypertension</td>
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<td>DPP</td>
<td>Diabetes Prevention Programme</td>
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<td>ED</td>
<td>Energy-Dense or Energy Density</td>
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<td>EDB</td>
<td>Energy Density of Beverages</td>
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<td>EDF</td>
<td>Energy Density of Foods</td>
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<td>EER</td>
<td>Estimated Energy Requirements</td>
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<td>EI</td>
<td>Energy Intake</td>
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<td>FFQ</td>
<td>Food Frequency Questionnaire</td>
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<td>FSANZ</td>
<td>Food Standards Association New Zealand</td>
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<td>GI</td>
<td>Glycaemic Index</td>
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<tr>
<td>GP</td>
<td>Doctor/General Practitioner</td>
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<tr>
<td>HC</td>
<td>Hip Circumference</td>
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<tr>
<td>HEELP</td>
<td>Healthy Eating and Exercise Lifestyle Programme</td>
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<tr>
<td>IHD</td>
<td>Ischaemic Heart Disease</td>
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<tr>
<td>LCD</td>
<td>Low Calorie Diet</td>
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<td>MetS</td>
<td>Metabolic Syndrome</td>
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<tr>
<td>MOH</td>
<td>Ministry of Health</td>
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<tr>
<td>MOHCTRU</td>
<td>Ministry of Health Clinical Trials Research Unit</td>
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<td>ND</td>
<td>Nutrient-Dense</td>
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<td>NEDC</td>
<td>National Eating Disorders Collaboration</td>
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<tr>
<td>NEEDNT</td>
<td>Non-essential, energy-dense, nutritionally-deficient</td>
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<tr>
<td>NEEDNT-FFQ</td>
<td>Non-essential, energy-dense, nutritionally-deficient food frequency questionnaire</td>
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<tr>
<td>NEF</td>
<td>Non-Essential Food</td>
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<td>NFAS</td>
<td>National Food Agency Sweden / Livsmedelsverket</td>
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<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>NHLBI</td>
<td>National Heart, Lung, and Blood Institute</td>
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<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
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<td>NICE</td>
<td>National Institute for Health and Clinical Excellence</td>
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<td>NIDDK</td>
<td>National Institute of Diabetes and Digestive and Kidney Diseases</td>
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<td>NIDDM</td>
<td>Non-Insulin Dependent Diabetes Mellitus</td>
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<td>NP</td>
<td>Nutrient-Poor</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>PEN</td>
<td>Practice-based Evidence in Nutrition</td>
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<tr>
<td>SHED-IT</td>
<td>Self-Help, Exercise, Diet and Information Technology</td>
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<td>SU.VI.MAX</td>
<td>Supplementation en Vitamines et Mineraux Antioxydants Study</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>UNFAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<td>USA</td>
<td>United States of America</td>
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<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
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<tr>
<td>USDHHS</td>
<td>United States Department of Health and Human Services</td>
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<tr>
<td>VLCD</td>
<td>Very Low Calorie Diet</td>
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<tr>
<td>WC</td>
<td>Waist Circumference</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<td>WHR</td>
<td>Waist to Hip Ratio</td>
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<td>Glossary of terms</td>
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<tr>
<td><strong>App</strong></td>
<td>Refers to smartphone apps or applications.</td>
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<tr>
<td><strong>Atkins Low Carb Diet™</strong></td>
<td>Atkins is a low-carbohydrate dietary approach originally developed by Robert Atkins, hereafter referred to as Atkins Low Carb Diet™ or Atkins™.</td>
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<tr>
<td><strong>BMI</strong></td>
<td>BMI is the universal system for measuring and classifying underweight, normal weight, overweight, and classes of obesity.</td>
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<td><strong>Fad Diet</strong></td>
<td>Generally refers to a weight loss plan that promises dramatic results. These diets typically don't result in long-term weight loss and are usually not healthy or sustainable. Some of these diets may have adverse health effects.</td>
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<td><strong>GI</strong></td>
<td>A figure representing the relative ability of a carbohydrate food to increase the level of glucose in the blood on a scale of 1-100. Generally, low GI is defined as ≤55, medium GI as 56-69, and high GI as ≥70.</td>
</tr>
<tr>
<td><strong>Iso-Caloric</strong></td>
<td>Refers to meals or liquids that may vary in portion size, water content, or macronutrient composition, while containing identical energy content.</td>
</tr>
<tr>
<td><strong>Kilocalorie</strong></td>
<td>A kilocalorie (kcal) is a unit of energy in the metric system, used to measure the energy contained within foods and beverages. Kilocalories have been superseded in the International System of Units by the kilojoule (kJ). In spite of their non-official status, kilocalories (or more colloquially, ‘calories’) are still widely used as a unit of food energy. One kilocalorie (kcal) is equal to 4.186 kilojoules (kJ). Please also see ‘kilojoule’ below.</td>
</tr>
<tr>
<td><strong>Kilojoule</strong></td>
<td>A kilojoule (kJ) is a unit of energy in the International System of Units, used to measure the energy contained within foods and beverages. One kilojoule (kJ) is equal to 0.239 kilocalories (kcal). This thesis refers preferentially to kilojoules where reasonably possible. Please also see ‘kilocalorie’ above.</td>
</tr>
<tr>
<td><strong>LCD</strong></td>
<td>A Low Calorie Diet typically provides 1000-1200 kcal/day for women and 1200-1600 kcal/day for men.</td>
</tr>
<tr>
<td><strong>Main (Core) Food Groups</strong></td>
<td>Refers to the key food groups as outlined by the New Zealand MOH Food and Nutrition Guidelines, being: ‘Vegetables and Fruits’, ‘Breads and Cereals’, ‘Milk and Milk Products’, and ‘Lean Meat, Poultry, Seafood, Eggs or Alternatives’</td>
</tr>
<tr>
<td><strong>Moderation</strong></td>
<td>A general and unofficial term used by the lay public and health professionals to describe a way of eating that is neither excessive nor restrictive. For example, the Oxford dictionary describes Moderation as ‘The avoidance of excess or extremes’ or ‘Within reasonable limits; not to excess’. Further definitions and concepts of moderation are explored within Chapter 5 (Findings).</td>
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<tr>
<td><strong>Obesity</strong></td>
<td>Defined as a BMI of 30.0 or greater. Obesity is further classified by degree: A BMI of 30.0-34.9 is class I obesity; a BMI of 35.0-39.9 is class II obesity; and a BMI of ≥ 40.0 is class III obesity.</td>
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<tr>
<td>Term</td>
<td>Definition</td>
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<td>Optifast™</td>
<td>A VLCD commonly used for rapid weight loss prior to obesity/bariatric surgery.</td>
</tr>
<tr>
<td>Overweight</td>
<td>Defined as a BMI of 25.0-29.9.</td>
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<tr>
<td>Pacific or Pasifika</td>
<td>Pasifika is a term unique to Aotearoa and describes migrants from the Pacific region and their descendants. The terms Pacific and Pasifika are used interchangeably throughout this thesis.</td>
</tr>
<tr>
<td>VLCD</td>
<td>A Very Low Calorie Diet typically provides up to 800 kcal per day.</td>
</tr>
<tr>
<td>Weight Watchers™</td>
<td>Weight Watchers International is a weight loss company, which utilises a points systems and offers various products and services to assist weight loss and maintenance.</td>
</tr>
<tr>
<td>Weight-Cycling</td>
<td>Weight-cycling refers to repeatedly losing and gaining weight. Weight-cycling is often a result of so called ‘yo-yo’ dieting. A weight ‘cycle’ can range from small weight losses and gains to larger weight fluctuations.</td>
</tr>
</tbody>
</table>
Note for readers

Throughout this thesis, references to the ‘NEEDNT Foods Moderation Guidelines’ are often shortened to the ‘Moderation Guidelines’ for brevity and ease of reading. All references to either NEEDNT Foods Moderation Guidelines or Moderation Guidelines refer to the preliminary version, created and pre-tested by participants as part of this research thesis. References to a future, fully developed version are distinguished from the preliminary version, through the terms ‘finalised’ or ‘revised’, e.g. finalised NEEDNT Foods Moderation Guidelines.
1 Introduction

Obesity has increased dramatically over recent decades and is now considered a global health epidemic (WHO, 2015c). Recent data indicates New Zealand adults now rank third highest out of fifteen OECD countries for measures of obesity (OECD, 2014). The latest New Zealand Health Survey (MOH, 2015a) found 31% of adults aged 15 years and over were obese, and a further 34% were overweight. Māori and Pacific New Zealanders were disproportionately affected, with 48% of adult Māori, and 68% adult Pasifika classified as obese (MOH, 2015a). Obesity is associated with an increased risk of NIDDM, IHD, stroke, several cancers, osteoarthritis, sleep apnoea, and reproductive abnormalities (MOH, 2015a).

Understandably, obesity has considerable adverse effects on the physical and psychological wellbeing of those afflicted (Ulijaszek, 2003) while presenting a substantial challenge and burden upon the New Zealand health care system (Marret, 2014). At the most rudimentary level, overweight and obesity result from excess of energy intake (from kilocalories [kcal] or kilojoules [kJ] in foods and beverages) relative to energy expended (through basal metabolic functions and physical activity). More pertinent than how obesity occurs however, is why, within a few decades, we have seen such a marked shift towards positive energy balance. The answer lies chiefly in our increasingly ‘obesogenic’ environment, which promotes increased consumption of high-energy foods and beverages, alongside reduced incidental physical activity (Caballero, 2007; Giskes, van Lenthe, Avendano-Pabon, & Brug, 2011; Lake & Townshend, 2006; Swinburn, Egger, & Raza, 1999). As of 2009, the total daily food production in New Zealand was in excess of 8000 kcal per capita (UNFAO, 2013). To put this in context, most adult men and women do not require more than around 2500 and 2000 kcal respectively per day (WHO, 2015b). Furthermore, the source of our energy has shifted, from predominantly unadulterated whole foods, to highly processed convenience foods (WHO, 2015b). Researchers, clinicians, and health bodies unanimously recognise the widespread availability
and tenacious marketing of inexpensive energy-dense, nutrient-poor foods and beverages, as a key driver of excessive energy intakes and reduced dietary quality (Drewnowski, 2000; MOH, 2014; Swinburn, 2008). These ‘empty calories’ are usually highly palatable, and potentially addictive, due to the physiologically reinforcing qualities of added sugars, fats, and salt (Gearhardt, Davis, Kuschner, & Brownell, 2011; Kessler, 2009). When combined, these biological and environmental influences create a ‘perfect storm’ for obesity to flourish.

Dietary advice from health bodies and health professionals often comprise phrases such as ‘eat in moderation’, ‘reduce fat and sugar’, ‘decrease energy intake’, or ‘limit energy-dense foods and beverages’ (MOH, 2003; MOH, 2009). However, in such a complicated food environment, such generalised advice can be difficult to interpret and apply successfully (Lobstein, 2009; Gorton, 2007). Additionally, the food industry, whose primary incentive is profit, further confuses the lay public through misleading health claims such as ‘99% fat-free’, ‘all natural ingredients’, and ‘no added sugar’ (Gorton, 2007). Consumers can, provided they are suitably motivated and educated, refer to mandatory nutrition information panels, ingredients lists, or front-of-pack labelling. However, research indicates most consumers find current labelling schemes overly technical and confusing (Gorton, 2007).

In light of these complex challenges, there is a real need for simple, unambiguous guidance to assist obese people in choosing what and how much to eat. Ultimately, governmental regulation of the food industry and food supply would organically generate changes in our food environment sufficient to incite meaningful improvements in population-level health (Nesheim & Nestle, 2012). However, in lieu of this ideal, we urgently need individual-level strategies to assist those who are overweight and obese to easily distinguish and adequately regulate their consumption of problematic energy-dense, nutrient-poor foods, which can add considerably to energy intakes, while providing little essential nutrition.
The NEEDNT Food List™, an acronym for ‘non-essential, energy-dense, nutritionally-deficient’ foods and beverages, was developed as a resource for health professionals working with overweight and obese persons wanting to lose weight (Elmslie, Sellman, Schroder, & Carter, 2012). The list comprises foods that are typically high in energy, and either lacking in essential nutrients, or easily replaced by lower energy, nutrient-dense alternatives (Appendix M; page 215).

The present study involved three progressive stages. The first stage involved creating the technical foundation for the Moderation Guidelines, by developing a points system to denote units of energy, and recommended quotas for NEEDNT foods and beverages based upon an acceptable proportion of average estimated energy intakes. In doing so, the Moderation Guidelines attempt to quantify the inherent messages of moderation within the New Zealand Food and Nutrition Guidelines statements for healthy adults, particularly those pertaining to energy-dense, nutrient-poor foods and beverages. The second stage involved pre-testing the usability and appeal of the Moderation Guidelines, by qualitatively exploring the experiences of a group of potential future users, over a 4-week trial period. This person-centred approach is in accordance with the Code of Ethics and Conduct for Dietitians, in particular, the principle of ‘working in partnership with consumers’. The final stage involved making comprehensive recommendations for revisions to further develop the Moderation Guidelines into a finalised version, and to ascertain key areas of future research for the NEEDNT concept and the Moderation Guidelines.
2 Literature review

The objectives of the following literature review are:

**Objective 1:** Identify the terms, definitions, and classifications for dietary energy density.

**Objective 2:** Critically evaluate the evidence related to dietary energy density, body weight, and weight management for obesity.

**Objective 3:** Compare and contrast recommendations from official health bodies regarding dietary energy density.

**Objective 4:** Briefly review the qualitative literature pertaining specifically to participant-led evaluations of nutrition education materials or programmes designed for weight loss.

2.1 Introduction and overview

2.1.1 Scope of literature review

The focus of this literature review is primarily a critical appraisal of the relationship between dietary energy density, in its various forms, and body weight, the overall purpose of which is to examine the significance of focusing on energy density and nutrient density in the dietary treatment of obesity. For the same reason, this review examines the recommendations of existing national dietary guidelines, relating to energy density and nutrient density. A secondary focus of this review is dedicated to examining a small body of specific literature, in which participants, rather than study researchers, evaluate nutrition education materials or weight loss programmes. The rationale here is to identify potential parallels, between those studies, and the current likeminded study, which pre-tests the usability and appeal of the Moderation Guidelines, from the participants’ points of view. However, this review does not examine
literature pertaining to behaviour change theories, best practice principles in nutrition education, or elements of visual design. While these topics were deemed outside the scope and timeframe of the current thesis, they are nonetheless considered highly relevant to the development of nutrition education materials for weight loss. As such, this author recommends the inclusion of these subject areas within a subsequent research phase, which is outlined further in Chapter 6 (Discussion and conclusion).

2.1.2 Literature review search strategy

Searches were conducted through Medline, PubMed, Scopus, Web of Science, ProQuest, CINAHL, Google Scholar, University of Otago Library Catalogue, and Te Puna National Library of New Zealand Catalogue, using the following keywords according to topic:

2.1.3 Search terms for ‘overview of dietary energy density’

Energy density, empty calories, discretionary calories, nutrient density, definition, classification, calculation, and moderation.

2.1.4 Search terms for ‘dietary energy density, overweight, and obesity’

Energy density, empty calories, discretionary calories, nutrient density, body mass index, BMI, overweight, obesity, weight loss, weight reduction, weight maintenance, dietary interventions, dietary treatment, and dietary approaches.

2.1.5 Search terms for ‘guidelines for the consumption of energy-dense foods and beverages’

National nutrition guidelines, clinical guidelines, evidence-based guidelines, best practice, overweight, obesity, and weight management.
2.1.6 Search terms for ‘participants’ evaluations of nutrition education materials or programmes for weight loss’

Qualitative, participant, evaluation, feedback, assessment, efficacy, appeal, usability, perceptions, experiences, person-centred, end-user, weight loss, resource, nutrition education, and programme.

2.1.7 Search criterion

The searches were limited to peer reviewed studies, involving human subjects, and published in English, between 2003 and 2015. A limited number of articles published prior to 2003 were included to provide important background or contextual information. Abstracts were examined for relevance and articles were excluded if they focused predominantly on:

Children/adolescents <18 years, bariatric surgery, pregnancy, cancer, NIDDM (excluding MetS), pharmacological weight loss aids, dietary variety, habituation, hedonics, obesity prevention, obesity management at a community or population level, public health obesity initiatives, food insecurity, restrictive versus non-restrictive dietary messages (restraint theories), obesity and emotional or addictive eating, binge eating, eating disorders, and non-food related environmental factors contributing to obesity. Additionally, qualitative evaluation studies were excluded if they pertained to public health campaigns, school-based education programmes, or were evaluated by researchers rather than by participants.

2.2 Overview of energy density and nutrient density

2.2.1 Definitions of energy density and nutrient density

Energy density is a relative term, which is generally defined as the food energy content (kilojoules) per weight (grams) of food. A definition of energy-dense foods and beverages is provided within the ‘Clinical Practice Guidelines for the Management of Overweight and Obesity in Adults, Adolescents and Children in Australia’ (NHMRC, 2013a):
Energy-dense food and drinks are those that provide relatively high amounts of kilojoules per gram, millilitre and/or serve. The World Health Organization (2003) states that energy-dense foods tend to be processed foods that are high in fat and/or sugar. Low energy-dense (or energy dilute) foods such as fruits, legumes, vegetables and whole grain cereals, are high in dietary fibre and water.

(Adapted from NHMRC, 2013a, p. 174)

Like energy density, nutrient density is a relative term, and is less well defined compared to energy density. Nutrient density generally refers to foods that are low in energy (kilojoules) but rich in other nutrients, namely micronutrients, i.e. vitamins and minerals (NHMRC, 2013a). The Australian Dietary Guidelines discuss energy-dense, nutrient-poor foods in relation to disease as follows:

Most of the burden of disease due to poor nutrition in Australia is associated with excess intake of energy-dense and relatively nutrient-poor foods; those high in energy, saturated fat, added or refined sugars or salt; and/or an inadequate intake of nutrient-dense foods, including vegetables, fruit and wholegrain cereals.

(Adapted from NHMRC, 2013b, p.1)

Furthermore, many researchers have defined their own terminologies, definitions and examples of energy-dense, nutrient-poor foods and beverages, as outlined in Table 1 (page 8).
Table 1. Various definitions of energy-dense and nutrient-poor foods and beverages

<table>
<thead>
<tr>
<th>Term</th>
<th>What is meant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty calories</td>
<td>Not fruit, vegetables, dairy, meat, or bread</td>
</tr>
<tr>
<td>Junk foods</td>
<td>Oreo cookies, potato chips, laboratory chow</td>
</tr>
<tr>
<td>Energy-dense, nutrient-poor foods</td>
<td>“Other foods” (fats, sweets, and alcohol), other than meat, dairy, grain, fruit, or vegetable</td>
</tr>
<tr>
<td></td>
<td>Visible fats, sugars, sweetened beverages, desserts, snacks</td>
</tr>
<tr>
<td>High-calorie, low-nutrient-dense foods</td>
<td>Candy, chips, soda, baked goods, ice-cream</td>
</tr>
<tr>
<td>Low-nutrient-dense foods</td>
<td>Visible fats; cakes, cookies, donuts; soft drinks; sugar, syrups, jams; potato chips and corn chips; ice cream, sherbet, frozen yoghurt</td>
</tr>
<tr>
<td></td>
<td>Visible fats, sweeteners, baked and dairy desserts (e.g., cookies, cakes, pies, pastries, ice cream, puddings, cheesecake), salted snacks, coffee and tea</td>
</tr>
<tr>
<td></td>
<td>“Red foods”: &gt;5 g fat/serving or low in nutrient density; fats, oils, sweets, combination foods (pizza, hamburger, lasagne)</td>
</tr>
<tr>
<td>Low nutrient-density foods</td>
<td>Fat, sugar, candy, soft drinks, baked desserts, dairy desserts, salted snacks, coffee, tea</td>
</tr>
<tr>
<td></td>
<td>Baked and dairy desserts, sweeteners, salty snacks, visible fat, coffee, tea</td>
</tr>
<tr>
<td></td>
<td>Cakes, cookies, pastries; carbonated beverages; sugars, jams, syrups; salty snacks</td>
</tr>
<tr>
<td>Energy-dense snack foods</td>
<td>Baked goods, ice cream, chips, sugar-sweetened soda, candy</td>
</tr>
<tr>
<td>“Bad” foods</td>
<td>Meat, fried potatoes, cheese, butter, margarine, white bread, pancakes, cookies, ice cream, candy, sugar</td>
</tr>
<tr>
<td>Unhealthful competitive foods</td>
<td>Fat &gt;30%, saturated fat &gt;10%, sugar &gt;15 g, caffeine</td>
</tr>
<tr>
<td>Foods of minimum nutritional value</td>
<td>&lt;5% of the USA recommended dietary allowance for protein, calcium, iron, vitamin A, vitamin C, riboflavin, thiamine, niacin (per serving)</td>
</tr>
</tbody>
</table>

Table adapted from ‘Common examples of foods described as healthy, healthful, nutrient-dense, or nutrient-rich’ (Drewnowski, 2005, p. 724)
2.2.2 Calculations and classifications for energy density and nutrient density

Unsurprisingly, there are currently no universal, standardised methodologies for calculating or classifying energy density or nutrient density, either independently or in combination. However, researchers frequently describe their own methods for calculating energy density and nutrient density, as part of observational or experimental nutritional studies. For example, de Castro (2005) describes a common method for calculating energy density, as follows:

Dietary energy density is usually calculated as a ratio of total food energy divided by total weight. The food energy component of density is composed of the macronutrients (carbohydrate, fat, protein, and alcohol) contained in both foods and drinks, while the weight component is composed of the macronutrients, non-nutritive solids, water contained in the foods, and water ingested as drinks along with the meal.

(Adapted from de Castro, 2005 p. 32)

In lieu of an official classification system for energy-dense, nutrient-poor foods, there are several promising nutrient profiling systems, each in varying stages of development and validation. Nutrient profiling systems are a way of ranking or categorising foods on the basis of their nutritional composition (Townsend, 2010). Such systems include the Nutrient Rich Foods Index [NNR] (Drewnowski, 2005; Drewnowski, 2010; Fulgoni, Keast, & Drewnowski, 2009; Glanz et al., 2012), NuVal and the Overall Nutritional Quality Index [ONQI] (Katz, Njike, Rhee, Reingold, & Ayoob, 2010), Guiding Stars (Fischer et al., 2011), the Smart Choices front-of-package nutrition labelling programme (Lupton et al., 2010), the Traffic Light System (Kelly et al., 2009), and The Heart Foundation Tick (Heart Foundation, 2015). As an example, Drewnowski (2005) comments on the framework for measuring nutrient density, through a proposal for the NNR:

A review of the literature shows that the concept of a nutritious food is not based on
any consistent standards or criteria. In many cases, healthful foods are defined by the absence of problematic ingredients, such as fat, sugar, and sodium, rather than by the presence of any beneficial nutrients they might contain. Past attempts to quantify the nutrient density of foods have been based on a variety of calculations, such as calories-to-nutrient scores, nutrients-per-calorie indexes, and nutrient-to-nutrient ratios. The naturally nutrient rich (NNR) score, which is based on mean percentage daily values for 14 nutrients in 2000 kcal food, can be used to assign nutrient density values to foods within and across food groups.

(Adapted from Drewnowski, 2005, p. 721)

2.3 Dietary energy density, overweight and obesity

2.3.1 Observational studies (cohort, case-control, cross-sectional and longitudinal)

Numerous studies have examined the relationship between dietary ED, EI, and BMI. De Castro (2004) collected detailed 7-day food records from 952 free-living individuals to explore the relationship between ED, EI and BW. The investigators found high ED was associated with significantly greater total EI ($p < 0.001$), particularly total fat intake, regardless of under-reporting or whether or not beverages were included in ED calculations. High ED was also associated with increased speed of eating ($r = 0.46, p < 0.001$) and larger portion sizes ($r = 0.61, p < 0.001$). Nevertheless, ED was not correlated with BMI ($r = -0.02$). De Castro and Plunket (2002) proposed that while high ED was related to increased total EI over shorter periods, compensatory effects might attenuate the impact of ED on BMI over the longer term.

Kant and Graubard (2005) investigated ED in relation to food group intake, nutrient intake, and BW, using data from the 1988–1994 National Health and Nutrition Examination Survey. ED was defined and calculated in three ways: Energy content (kJ/g) of all foods and beverages [ED1]; Energy content of all foods and energy-yielding beverages [ED2]; and Energy content of all foods, excluding beverages [ED3]. In terms of caloric intake, all three classifications of
ED were associated with higher EI ($p < 0.0001$). Additionally, ED2 and ED3 were modest, but independent, positive predictors of BMI in both men and women ($p \leq 0.03$) after adjusting for covariates relating to BW and dietary underreporting. These findings are in contrast to those of de Castro (2004) who observed no association between BMI and ED in free-living individuals. It is possible that the use of 7-day self-administered diet diaries by de Castro (2004) may have underestimated ED, compared to Kant and Graubard (2005), who used 24-hour dietary recalls collected by trained dietary interviewers. Furthermore, it may be that general measures of ED, when not investigated alongside ND, cannot adequately account for the relationship between EI and BW.

Ledikwe et al. (2006a) conducted a cross-sectional survey (n=7356) using data from the 1994–1996 Continuing Survey of Food Intakes by Individuals, and two 24-hour diet recalls. Adults who consumed a low ED diet had lower mean total EI (men 432 and women 278 kcal/day less) while consuming significantly ($p < 0.05$) greater total food weight (men 396 and women 295 g/day), compared to adults consuming high ED diets. Overall, normal-weight subjects had lower ED diets than obese subjects. Furthermore, subjects with the highest fruit and vegetable intakes had the lowest ED values, and the lowest prevalence of obesity. The prevalence of obesity was 6% lower for men and 5% lower for women with a low ED diet compared to those with a high ED diet ($p = 0.03$ and $p = 0.08$, respectively).

Howarth, Murphy, Wilkens, Hankin, and Kolonel (2006) observed the relationship between ED and BMI in a large study of 191,023 subjects from the Hawai`i and California Multi-Ethnic Study of Diet and Cancer. The cohort comprised African American, Native Hawai`ian, Japanese American, Latino, and Caucasian ethnicities. ED was calculated from quantitative FFQs and validated against measures from multiple 24-hour diet recalls. As might be expected due to cultural differences in food preferences and dietary patterns, mean ED varied from a low of 4.62 kJ/g in Japanese American men, through to a high of 5.08 kJ/g in African American men. Similarly, mean BMI was lowest in Japanese American men and women, and highest in
Native Hawaiian men and African American women. After adjusting for confounding variables, a 1 kJ/g increase in ED was associated with an increase in BMI of approximately 1 kg/m² in each ethnic sex group, and a significantly increased risk of being overweight across all ethnic sex groups; from 4% in African American men to 34% in Japanese American women. The authors commented that 1 kJ/g change in ED is not unreasonable to attain through dietary modifications. These results highlight the consistency of an association between ED and BW across diverse ethnic groups. However, epidemiological studies and intervention trials are needed, to investigate disparities in associations between ED, BMI and obesity risk, across ethnic groups.

Mendoza, Drewnowski, and Christakis (2007) conducted a cross-sectional study, using data from the 1999–2002 National Health and Nutrition Examination Survey (n=9,688), to examine whether ED was associated with obesity, obesity-related disorders, insulin resistance, and MetS. ED calculations were based on foods only. ED was independently and significantly associated with higher BMI in women (β = 0.44 [95% CI 0.14–0.73]) and came close to being significant in men (β = 0.37 [−0.007 to 0.74], p = 0.054). ED was associated with larger WC in both women and men (β = 1.11 [0.42–1.80] and β = 1.33 [0.46–2.19] respectively). Interestingly, there was an independent association found between ED, and both elevated fasting insulin (β = 0.65 [0.18–1.12]) and MetS (prevalence ratio = 1.10 [95% CI 1.03–1.17]). As such, a negative cycle is possible, whereby ED independently increases BMI and central adiposity, promoting the development of MetS and reinforcing obesity. However, more research is needed to establish a causal relationship between the mechanisms linking ED, obesity, and metabolic disorders.

Hartline-Grafton, Rose, Johnson, Rice, and Webber (2009) examined the independent associations between EDF and EDB, and their effects on EI and BMI, in 348 randomly selected, free-living adult women. Dietary intake data were gathered through two 24-hour diet recalls taken on non-consecutive days by trained dietitians. Subjects in the highest EDF tertile
consumed more energy and had higher BMIs than those in the lowest tertile \((p < 0.05)\). However, while subjects in the highest EDB tertile consumed more energy than those in the lowest, there were no significant differences in BMIs among EDB tertiles. Controlled multivariate regression analyses revealed a positive association between EDF and BMI, with a 1 kJ/g increase in EDF associated with a 0.39 kg/m\(^2\) increase in BMI \((p = 0.038)\). However, when EDF and EDB were combined, the coefficient was 8% lower, and no longer statistically significant. This result suggests EDB can confound an association between ED and BMI. Furthermore, this cross-sectional research cannot establish causality between EDF, EDB, and BMI. As such, future research is required to further understand the relationships between EDF, EDB, total EI, and BMI. Additionally, Ledikwe et al. (2007a) noted the potential influences of weight variability, in this study and other cross-sectional studies, by saying:

> The failure to find significant relationships between energy density and body weight may have been due to the cross-sectional nature of the studies, e.g. if subjects did not have a stable body weight over time.

(Adapted from Ledikwe et al., 2007a, p. 1219)

In addition to the aforementioned observational studies, numerous longitudinal studies have observed a positive association between low ED diets and weight loss (Bes-Rastrollo et al., 2008; Ello-Martin, Roe, Ledikwe, Beach, & Rolls, 2007; Flood et al., 2009; Iqbal, Helge, & Heitmann, 2006; Lapointe et al., 2010; Ledikwe et al., 2007a; Melanson et al., 2012; Raynor, Looney, Steeves, Spence, & Gorin, 2012b; Raynor, Steeves, Hecht, Fava, & Wing, 2012a; Rolls, Roe, Beach, & Kris-Etherton, 2005a; Saquib et al., 2008; Schusdziarra et al., 2011).

A study by Du et al. (2009) observed a large cohort of 89,432 subjects, from five European countries, over an average of 6.5 years. The associations between ED and annual changes in BW and WC were examined. ED (adjusted for energy-containing beverages) was not associated with changes in BW, but was significantly associated with changes in WC in subjects with a
baseline BMI >25 kg/m²; a 1 kcal/g change in ED was associated with 0.17 cm/year change in WC [95% CI: 0.09, 0.25]. These results imply that while low ED diets may not prevent weight gain per se, they may moderate abdominal obesity; a major risk factor for chronic disease (Zhang, Rexrode, van Dam, Li, & Hu, 2008). It is possible that those with higher ED compensated through subsequent reductions in EI (Saquib et al., 2008). The lack of an association between ED and weight change in this study differs from other prospective cohort studies, which found positive associations between ED and weight change (Bes-Rastrollo et al., 2008; Iqbal et al., 2006; Savage, Marini, & Birch, 2008).

Another large prospective study of 50,026 women from the Nurses’ Health Study II aimed to assess the long-term relationship between changes in ED and age-related weight gain (Bes-Rastrollo et al., 2008). ED and BW data were collected in 1991, 1995, and 1999. Total ED was calculated by dividing daily EI (kcal) by the reported weight (g) of all foods consumed, excluding beverages. Over the 8-year period, the study found women who increased their ED the most during follow-up (highest quintile) had a significantly greater multivariate-adjusted weight gain than those who decreased their ED (lowest quintile), resulting in a 6.42 kg gain compared to a 4.57 kg gain, respectively (p for trend > 0.001). However, the magnitude of weight change varied considerably among this population, according to ED of individual foods and beverages. For example, changes in the consumption of foods with relatively higher ED (olive oil and nuts) were not associated with weight gain, whereas changes in the consumption of foods with relatively lower ED values (soda, fruit punches, and potatoes) were associated with greater weight gain. Thus, the positive associations between changes in ED and weight gain observed in this study are likely due to a healthier dietary pattern overall, influenced by ED and ND, rather than ED alone.

Iqbal et al. (2006) examined whether ED and other dietary components predicted subsequent 5-year weight changes. Subjects were 1762 men and women within the WHO Multinational Monitoring of Trends and Determinants in Cardiovascular Disease. Mean 5-year changes in
BW were 1.2 ± 3.9 kg for men, and 1.3 ± 4.6 kg for women. But, neither ED nor any other dietary component was associated with subsequent change in BW. In women, ED was positively associated with weight gain among the obese (BMI > 30 kg/m²) while being inversely associated with weight gain in normal-weight women (BMI < 25 kg/m²) ($p = 0.01$). However, in men there was a non-significant inverse trend between ED and weight gain in the obese. While the authors of this study acknowledged that dietary ED could be a risk factor among certain subgroups, on the whole, the analyses did not support the concept of ED as a fundamental determinant of obesity. As previously observed for Bes-Rastrollo et al (2008), this could be due to the crude calculation of ED, which does not account for variations in nutritional quality, e.g. ED and ND versus ED and NP. Furthermore, the study did not assess changes in ED, but rather, compared baseline ED values against 5-year weight changes. Dietary habits may well have changed during the 5 years of follow-up, and thus, failure to assess changes in ED may have concealed potential associations with BW.

Raynor et al. (2011) conducted a secondary data analysis comparing self-reported ED and food group servings consumed in overweight adults [OW] ($n=97$), normal-weight adults [NW] ($n=85$), and weight loss maintainers [WLM] ($n=105$); currently normal weight, lost ≥ 10% of maximum BW, and maintained loss for ≥5 years. ED was calculated by three methods: Food and all beverages except water [F+AB]; Food and caloric beverages [F+CB]; and Food-only [FO]. All three forms of ED were significantly lower in the WLM group compared to the NW or OW groups (FO ED for WLM = 1.39 ± 0.45 kcal/g; NW = 1.60 ± 0.43 kcal/g; OW = 1.83 ± 0.42 kcal/g). Self-reported daily EI was significantly lower in the WLM group compared to the OW group, while total food and beverage weight was significantly greater in the WLM group compared to the OW group. These findings suggest that lower ED diets may be an effective strategy, not just for weight loss, but for maintenance of weight loss and prevention of weight gain, through the ad libitum reduction of EI associated with a greater volume of food consumed (Rolls, Drewnowski, Ledikwe, 2005b).
Vergnaud et al. (2009) set out to investigate the relationship between ED and 6-year changes in BW, and body fat distribution assessed through WC, HC and WHR measurements, in 2707 free-living middle-aged French men and women. Subjects were part of The Supplementation en Vitamines et Mineraux Antioxydants study, a randomised, double-blind, placebo-controlled primary prevention trial. The 8-year trial investigated daily antioxidant supplementation in reducing the incidence of IHD and cancers. Secondary analyses by Vergnaud et al. (2009) aimed to differentiate abdominal adiposity from global/general adiposity; theorising that abdominal obesity may be a stronger predictor than BMI in obesity-related diseases such as CVD and some cancers (Dobbelsteyn, Joffres, MacLean, & Flowerdew, 2001; Harvie, Hooper, & Howell, 2003). The relationship between ED and anthropometric changes differed according to baseline BW status, with both baseline ED, and variation in ED during the follow-up related to an increased 6-year weight gain, but only in overweight subjects. In overweight subjects, weight gain was positively associated with high ED at baseline ($P$ for trend = 0.03) and with increasing ED during follow-up ($P$ for trend = 0.0008). Additionally, WC and HC changes were positively related to baseline ED, and with changes in ED in overweight subjects. Despite the relationships observed for WC and HC, changes were not significant after adjusting for BW change. The authors suggested this might have been due to decreased physical activity levels observed in overweight subjects, therefore diminishing the association. A limitation of this study is that the most compliant subjects were selected, i.e. those who completed at least three dietary records at baseline and at follow-up, to ascertain baseline ED status and longitudinal analyses. Consequently, the study sample may have had healthier dietary and lifestyle patterns than the general population.

Savage et al. (2008) conducted a similar study, to examine whether ED predicts weight change over 6 years among free-living non-Hispanic, white women ($n=186$). ED was calculated from energy content of foods, excluding beverages, by three 24-hour diet recalls. ED was positively associated with weight gain and higher BMI over time, across all BMI classifications. The data
indicated that, on average, women gained 3.7 kg or approximately 5% of their initial BW, over the 6-year period. However, differences in ED were associated with differences in weight gain, with women consuming higher ED diets over this period gaining nearly 3 times as much weight as women on lower ED diets. It is worth noting that ED did not change over time for individual subjects. Women with a lower ED diet consumed a greater weight of food than did women with higher ED diets \((p < 0.0001)\) while having lower total EI. Women consuming the lowest ED diet consumed around 225 kcal/day less than women in the highest ED group \((p < 0.01)\). EI from caloric beverages did not differ by ED group, supporting the exclusion of beverages in calculating ED. These findings provide strong support for low ED dietary patterns in attenuating weight gain and promoting weight maintenance over time. One caveat however, is that while women consuming relatively low ED diets in this free-living sample had the least weight gain, they still gained weight over time. The results indicate these women were not consuming a diet low enough in ED to achieve a neutral energy balance necessary for preventing weight gain, thus supporting a need for additional dietary guidance for reducing dietary ED in free-living populations.

Flood et al. (2009) conducted a secondary analysis of the Lose It Forever Study, an 18-month randomised trial evaluating behavioural treatments for changing ED to achieve long-term weight loss, in 213 men and women with a BMI of 30-39 kg/m². Subjects were randomised to Standard Behavioural Treatment [SBT] comprising 45 meetings over 18 months. Subjects were given an EI goal of 1200, 1500 or 2000 kcal/day, depending on initial BW, and were advised to increase their levels of moderate intensity physical activity (primarily walking) to one hour per day. The Maintenance-Tailored Treatment [MTT] incorporated the same general diet and exercise goals but emphasised greater variety in both format and content. It is important to note that ED per se was not the focus of either treatment group, but rather, subjects were encouraged to eat lower ED foods in a general sense. Change in ED was strongly associated with change in BMI; subjects with the greatest decrease in ED at 18 months lost the most weight \((p = 0.006)\).
These changes in ED predicted weight loss most strongly in the first 6 months of follow-up, and occurred without changes to the weight of food consumed, while reducing EI; a result consistent with short-term feeding studies (Rolls, 2009).

Schusdziarra et al. (2011) analysed data from a cohort of 513 obese individuals who sought treatment for weight loss at a nutritional medicine outpatient clinic. Patients received tailored dietary counselling based on a detailed pre-treatment 10-day food diary. A dietitian and two physicians provided individualised dietary counselling, including instruction on substituting high ED items with low ED alternatives, and provision of print materials outlining the ED values of around 1500 food items categorised by food group. Patients were instructed to select ad libitum amounts of low ED foods from the booklet (≤1.5 kcal/g; marked in green) and to adjust portions to satiation. No limits were given for EI, nor were specific restrictions for medium/high ED foods given (1.6-2.4 kcal/g; marked in yellow, and ≥2.5 kcal/g; marked in red, respectively). Subjects were encouraged to reduce snack consumption or substitute for low ED options, avoid energy-containing beverages, maintain food diaries, and increase physical activity. During the 10.5-month treatment, the cohort significantly reduced mean BW from 112.8 ± 28.1 kg to 107.8 ± 26.8 kg. This equated to a reduction in BMI of -0.195 kg/m² per month (from 38.8 ± 8.5 at baseline). Thirty six percent of subjects lost >5% of their baseline BW, 44% lost 0-4.9%, and 20% gained weight. At follow-up (27.1 ± 12.8 months from baseline) 413 patients (80.5%) were successfully contacted. Eighty patients were treated continuously for the entire period, and 333 patients ended treatment at some point (self-treatment or ST). This ST group had further weight loss of -0.053 kg/m² per month over 16.8 months (40% weight loss, 46% maintenance and 14% weight gain). Patients who continued treatment lost more weight compared to ST, but the difference was not significant. This study provides promising preliminary data to support the use of individually tailored, ED-focused dietary advice, for achieving long-term weight loss.
Greene et al. (2006) conducted an observational study to determine weight maintenance and associated dietary intake patterns, for subjects two years post completion of the University of Alabama at Birmingham EatRight Weight Management Programme, a weight loss programme promoting low ED foods. Weight maintenance was defined as gaining <5% of BW since completion of the EatRight Programme and staying below their programme entry weight. Subjects in the follow-up study lost an average of 4.0 kg during the EatRight intervention. The average weight change was +0.59 kg (mean BMI, 32.5 kg/m²), after a mean follow-up time of 2.2 years, of which 78% of subjects gained <5% of their BW and 46% had no weight regain or continued weight loss. Mean adjusted EI for maintainers was 1608 kcal/day, compared to 1989 kcal/day for gainers, giving an adjusted difference of 244 kcal ($p = 0.058$). Despite the difference in EI, maintainers ate a similar amount of food, and thus a lower ED ($p = 0.016$) compared with those who regained. These promising results indicate that low ED dietary patterns can facilitate longer-term weight maintenance. The Weight Management Programme is based upon sustainable and healthful dietary changes, encouraging plentiful intakes of low ED, high ND foods (fruits, vegetables, whole grains), while limiting consumption of high ED foods (meats, cheeses, sugars, and fats). The results of this study indicate subjects can continue to incorporate low ED eating patterns that promote successful weight loss maintenance.

**2.3.2 Experimental studies (short-term feeding studies, randomised or non-randomised controlled trials, and uncontrolled trials)**

There are an increasing number of intervention studies that have explored the relationship between ED and EI. Numerous short-term, laboratory-based feeding studies have shown that serving low ED preloads, or modified ED meals, leads to reductions in EI (Blatt, Roe, & Rolls 2011; Devitt & Mattes, 2004; Flood & Rolls, 2007; Rolls, Roe, & Meengs, 2004a; Rolls, Roe, & Meengs, 2006; Kral, Roe, & Rolls, 2004; Stubbs & Whybrow, 2004; Williams, Roe, & Rolls, 2013). It has been hypothesised that people tend to eat a fairly consistent weight of food on a day-to-day basis, and this may be one mechanism underlying the relationship between reduced
ED, and subsequent decreases in EI (Astrup, 2008). Based on this premise, a slight reduction in overall ED, while maintaining usual daily food weight, would result in a reduction in energy, while maintaining satiety levels. Satiety is described as the effect of food after eating has finished (Rolls, 2009). To assess satiety, a fixed quantity of a specific food (a ‘preload’) is consumed, and after a period the effect of the preload on satiety is gauged, by measuring EI at a subsequent test meal. Satiety can also be measured by evaluating post-test meal ratings of hunger and fullness.

Recent studies suggest that reductions in ED of foods can be used advantageously to maintain adequate satiety while reducing EI. Williams et al. (2013) investigated the effects of three methods for reducing ED on EI over a day; decreasing fat, increasing fruits and vegetables, or adding water. Fifty-nine subjects participated in the crossover study, and ate breakfast, lunch and dinner in the laboratory one day per week for 4 weeks. One of three manipulated entrées were provided at each meal (reduced in ED by 20% compared to a standard entrée control) along with manipulated side dishes eaten ad libitum. All three methods of reduced ED preloads resulted in significant decreases in total daily EI compared to the control preload ($p < 0.0001$). The mean decreases were 396 ± 44 kcal/day when fat was decreased, 308 ± 41 kcal/day when fruits and vegetables were increased, and 230 ± 35 kcal/day when water was added. These decreases equated to a reduction in daily EI of 15%, 11%, and 9% respectively, compared to the control preload. Furthermore, ratings of hunger and fullness were similar across all conditions, despite the differences in EI. These findings indicate that lowering ED, either by decreasing fat, increasing fruit and vegetables, or adding water, are all effective in reducing daily EI while maintaining satiety.

Perrigue, Monsivais, and Drewnowski (2009) tested the effects of added soluble fibre (inulin) on the satiating properties of low ED and high ED yoghurt beverages. Thirty-eight men and women consumed a prescribed breakfast bar on six test days, which were spaced at least one week apart. Subjects were given one of six preload beverages in the laboratory: A high or a low
ED yoghurt beverage (440 kcal; 0.9 kcal/g and 180 kcal; 0.4 kcal/g respectively), with or without added inulin (6 grams), or an equal volume of orange juice (180 kcal; 0.4 kcal/g), or no beverage (control condition). An ad libitum lunch tray comprising a variety of foods followed shortly after. All beverage varieties significantly suppressed appetite and enhanced satiety compared to the control condition. Furthermore, yoghurt beverages had greater satiating power and reduced EI at lunch more than orange juice. As the orange juice and low ED yoghurt beverages were matched in terms of ED, the reasons for the difference in satiety and EI could be due to differences in macronutrient composition (namely protein and/or carbohydrate), or other physiological influences, such as rates of gastric emptying. The satiating power of low ED yoghurt with inulin was comparable to that of high ED yoghurt. While these results demonstrate the potential for low ED, protein and fibre enriched beverages to control EI, they also demonstrate the complex role beverages play within the area of ED, satiety, and EI.

Blatt et al. (2011) conducted a similar crossover study, in which different amounts of pureed vegetables were incorporated into preloads. Forty-one subjects consumed ad libitum breakfast, lunch, and dinner meals in the laboratory once a week for 3 weeks. Entrées were either standard (100%), or reduced in ED by incorporating 3 or 4.5 times the amount of hidden pureed vegetables (85% and 75%), and were accompanied by un-manipulated test meal side dishes. Subjects ate a constant weight of food across all conditions, thus significantly decreasing total EI by 202 ± 60 kcal/day or 6% in the 85% condition (p < 0.001) and 357 ± 47 kcal/day or 11% in the 75% condition (p < 0.0001) compared to the standard condition. Like Williams et al. (2013), there were no disparities in ratings of hunger and fullness between conditions, suggesting that reductions in ED can reduce daily EI without affecting satiety.

Flood and Rolls (2007) took a slightly different approach to studying ED and subsequent EI, by manipulating the form and texture of a soup preload. Sixty subjects of normal BW were served lunch in the laboratory once a week for 4 weeks. Lunches consisted of four varieties of soup against a control; broth and vegetables served separately, chunky vegetable soup, chunky-
pureed vegetable soup, pureed vegetable soup, or no preload (control). An un-manipulated test meal was provided shortly afterwards and consumed ad libitum. Subjects ate similar breakfasts (as per instruction) on test days. All soup conditions significantly reduced total EI at the lunch meal ($p < 0.0001$) by 20% or $134 \pm 25$ kcal/day, with no effects on hunger and satiety, compared to the no soup condition. There were no significant differences in EI between the soup conditions. These findings demonstrate that the form and viscosity of reduced ED foods can be tailored to an individual’s preference without compromising satiety levels.

In addition to explorations of satiety, other studies have investigated the hedonic rewards of food. Palatability refers to the subjective pleasantness of the taste of particular foods. McCrory, Saltzman, Rolls, & Roberts (2006) conducted a relatively long duration laboratory study (18 days) to investigate the relationship between ED, palatability, and EI, within the context of familial influences. Seven pairs of male homozygote twins were covertly fed ad libitum diets for two cycles of nine days. Diets were either high fat (HF: ~40% total EI) or low fat (LF: ~20% total EI), and the diets were matched for average ED, protein, fibre, and taste pleasantness. The study found that ED was positively associated with taste pleasantness ($r = 0.46, p = 0.03$) independent of the fat content. However, ED from individual foods was positively associated with both ED ($r = 0.56, p = 0.007$) and taste pleasantness ($r = 0.73, p < 0.0001$). Both ED and taste pleasantness influenced EI directly, and ED influenced EI indirectly by affecting taste pleasantness. Overall, there were significant within-twin pair similarities between ED and taste pleasantness, and between energy density and EI ($p < 0.03$), with some twin-pairs but not others preferring and consuming additional higher ED foods ($p < 0.03$). Furthermore, there was a significant twin-pair effect on changes in the ED/EI relationship over time, with the relationship becoming stronger in some twin-pairs, and weaker in other twin-pairs. These results suggest there may be familial influences, either learned or genetic, that increase an individual’s susceptibility to over-consume high ED foods.
Several studies have explored satiety further by investigating ED in conjunction with portion size (Devitt & Mattes, 2004; Kral et al., 2004; Mazlan, Horgan, & Stubbs, 2006; Rolls et al., 2004; Rolls et al., 2006). Devitt and Mattes (2004) explored the effects of food unit size and ED, in a within-subjects 2 x 2 design study of twenty adults. Subjects were provided with ad libitum breakfast, lunch and dinner meals in the laboratory on four non-consecutive days. Test foods were provided either as a small food unit [SFU] or a customary food unit [CFU], and differed in ED (low or high) by manipulating fat content. While similar weights of foods were consumed across all conditions, EI from high ED foods was significantly greater than for low ED foods, independently of food unit size, at breakfast ($p < 0.001$), lunch ($p < 0.05$), and the 24-hour period ($p < 0.001$). Regardless of differences in EI across conditions, there were no differences in hunger or fullness ratings observed. Data indicates food weight and volume may be more tightly regulated by the body’s physiological systems than ED, providing a mechanism by which people can reduce EI through reduced ED choices, while maintaining portion sizes and satiety (Ledikwe et al., 2007).

Kral et al. (2004) conducted a novel crossover study examining the combined effects of ED and portion size on EI. Thirty-nine women were served ad libitum breakfast, lunch and dinner meals once a week for 6 weeks. A lunch entrée preload was manipulated by ED (5.23 or 7.32 kJ/g) and served in 500, 700, or 900-gram portion sizes; all matched for macronutrient composition and palatability. Larger portion sizes and higher ED led to independent and cumulative increases in EI ($p < 0.0001$). In fact, subjects ate 56% more energy (925 kJ) when served the largest portion of the high ED entrée compared to the smallest portion of the low ED entrée, without any observed differences in satiety ratings. These results revealed subjects did not compensate for higher EI by consuming less energy at subsequent meals; again suggesting oversized portions may override an individual’s ability to self-regulate EI.

Rolls et al. (2004a) used a randomised crossover design to test the effect of various first-course salads, or no salad, on EI. Once per week for seven weeks, forty-two females consumed lunch
in the laboratory, comprising one of six entrée salads, varying in ED (0.33, 0.67, or 1.33 kcal/g) and portion size (150 or 300g), followed by an ad libitum pasta test meal. Low ED salads reduced total meal EI by 7% for the smallest portion and 12% for the largest portion, compared to the no salad condition. Conversely, high ED salads increased EI by 8% for the smallest portion and 17% for the largest portion, when compared to no salad. Of particular interest, when two iso-caloric salads with different ED were compared, total meal EI was lower when the large portion of low ED salad was consumed. Hence, salad portion size was the main determinant of EI at the subsequent test meal, and was the only significant determinant of satiety in terms of hunger and fullness ratings. Salad ED however had negligible effects on subsequent pasta intake, and was therefore the main determinant of total meal EI. These findings reiterate the premise that people are less sensitive to the effects of ED compared to portion size.

Mazlan et al. (2006) examined the effects of varying ED and portion sizes of breakfast and a mandatory snack on subsequent EI. Sixteen normal-weight males were fed a standard kilojoule diet the day prior to testing. On day two, subjects ate one of four fixed manipulated breakfasts and mid-morning snacks (control, low ED, high ED, or 2 x low ED), followed by ad libitum high-protein, high-fat, and high-carbohydrate options for the remainder of the day. Subjects were found to be hungrier following the control and low ED treatments in the morning period ($p < 0.001$). The high ED breakfast treatment was associated with lower lunch EI, but not with post-lunch EI. Total self-selected EI in the high ED treatment was lower than that of the low ED breakfast treatment. Despite this, the EI in the high ED breakfast treatment was higher when mandatory meals were included. The authors concluded that while subjects responded to manipulations in both portion size and ED, they only compensated total EI by around 40%, and only at the next meal.

Rolls et al. (2006) conducted another study to delineate the effects of portion size and ED on EI, this time across multiple meals, for 2 consecutive days per week for 4 weeks. In this crossover study, twenty-four females consumed ad libitum meals and snacks from identical
menus, except for variations in portion size and ED, which were either standard condition (100%) or reduced condition (75%). There were significant independent decreases in 2-day EI from reducing portion size and ED ($p < 0.0001$). Decreasing portion size by 25% led to a mean daily reduction of 231 kcal/day or 10%, while a 25% reduction in ED resulted in a mean daily reduction of 575 kcal/day or 24%, compared to the standard condition. Moreover, this study demonstrated that the effects on EI were additive, and sustained from meal to meal. Notably, ratings of hunger and fullness were not significantly different between conditions over each 2-day period.

A 3-month randomised controlled trial by Raynor et al. (2012b) examined prescriptive ED-based diets on weight loss in 44 overweight and obese adults. Subjects were randomly assigned to one of three treatment groups: Low-ED ($\geq 10$ foods $\leq 1.0$ kcal/g ED and $\leq 2$ foods $\geq 3.0$ kcal/g ED per day) ($n=15$); or Low-Energy, Low-Fat (1200 to 1500 kcal/day, $\leq 30\%$ energy from fat) ($n=15$); or Low-ED, Low-Energy, Low-Fat ($n=14$). Subjects received 12 weekly group sessions, led by a research interventionist, and tailored to their treatment group. Sessions included behavioural and cognitive skills to assist with changing dietary and physical activity behaviours, modelled from the Diabetes Prevention Programme (DPP Research Group, 2002). All treatment groups significantly reduced ED and EI ($p < 0.001$). This corresponded with significant weight losses across all groups ($p < 0.001$), and those in the Low-ED condition lost significantly more weight than the other two conditions ($p < 0.05$). Mean weight losses were $-20.5 \pm 7.0$ lbs. for Low-ED; $-16.9 \pm 10.1$ lbs. for Low-Energy, Low-Fat; and $-12.5 \pm 6.5$ lbs. for Low-ED, Low-Energy, Low-Fat. Also, both the Low-ED and the Low-ED, Low-Energy, Low-Fat interventions increased fruit consumption ($p < 0.05$). Some weight loss may have resulted from significant and similar increases in self-reported physical activity across all conditions ($p < 0.001$). Although the sample size was relatively small, and dietary data were self-reported, this study shows promise for low ED dietary prescriptions in different forms, for weight reduction in the overweight and obese.
A recent 18-month intervention trial by Raynor et al. (2012a) took a unique approach by investigating the effects of limiting the variety of various ‘non-nutrient-dense, energy-dense foods’ [NND-EDFs] such as chips, ice cream, and cookies, on dietary intake and weight loss, in 202 overweight and obese adults. Subjects were randomly assigned to one of two interventions: Lifestyle (1200-1500 kcal/day, 30% of energy as fat) \( (n=101) \) or Lifestyle plus limited variety \( [LV] \) (limit variety of NND-EDFs to 2 choices) \( (n=101) \). Like Raynor et al. (2012b) each treatment group involved 48 tailored group sessions modelled from the DPP (DPP Research Group, 2002). It was found that the Lifestyle+LV group consumed less variety \( (p < 0.01) \) and daily EI \( (p < 0.05) \) from NND-EDFs compared to the Lifestyle group at 6, 12, and 18 months. The Lifestyle+LV group also reported less NND-EDF variety in the home at 6 and 18 months than the Lifestyle group \( (p < 0.05) \). The hedonics (liking and palatability) of one chosen NND-EDF decreased more in the Lifestyle+LV group \( (p < 0.05) \). Despite these promising effects, there were no differences in weight losses between treatment groups at 18 months \( (−9.9 \pm 7.6\% \text{ for Lifestyle+LV versus } −9.6 \pm 9.2\% \text{ for Lifestyle}) \). It is possible that underreporting occurred in the Lifestyle+LV group, or, there may have been compensation through small differences in EI across other food groups. Hence, it may be necessary to target more NND-EDF foods, to overcome potential compensation, and produce a greater effect on weight loss and dietary quality.

Melanson et al. (2012) also examined the effects of a low ED diet prescription on weight loss, dietary composition, and risk factors for MetS. However, in this study, the two comparison groups were based on portion control and low glycaemic index prescriptions. Subjects \( (n=157) \) were randomised to one of the three treatment groups and attended weekly group sessions over the 12-week trial period. All groups significantly reduced BW and body composition \( (p < 0.001) \) and components of MetS \( (p < 0.027-0.002) \), but there were no significant differences among the three groups in any variable related to body composition, dietary composition, or MetS. Notably, ED did not differ significantly among the three groups, which is an important
caveat and indicates all three dietary approaches ultimately led to reductions in ED through different avenues.

A randomised trial by Lapointe et al. (2010) aimed to further investigate and separate the effects of ED on EI and BW, by comparing the use of non-restrictive messages to increase fruit and vegetable consumption [HIFV] against the use of restrictive messages to limit high-fat (and thus high ED) foods [LOFAT]. Sixty-eight overweight and obese postmenopausal women were randomly assigned to either HIFV or LOFAT interventions for 6 months, involving 3 group sessions and 10 individual sessions with a dietitian. ED decreased in both groups at 6 months (HIFV $-0.3 \pm 0.2$ kcal/g; LOFAT $-0.3 \pm 0.3$ kcal/g) ($p < 0.0001$). BW reduced significantly in both groups at 6 months compared to baseline (HIFV $-1.6 \pm 2.9$ kg; LOFAT $-3.5 \pm 2.9$ kg) ($p < 0.0001$). However, women in the LOFAT group lost significantly more weight than women in the HIFV group ($p = 0.01$). This result reinforces the importance of prioritizing the reduction of high ED foods, in this case from fats, to optimise weight loss. Women in the HIFV group, while increasing fruit and vegetable consumption, may not have sufficiently decreased EI from higher ED foods. Considering that small amounts of high ED foods can contain more energy than larger portions of low ED foods, it makes sense that reducing high ED foods should have a greater impact on reducing energy intake.

A randomised trial by Saquib et al. (2008) examined the effect of ED on BW, in 2,718 breast cancer survivors with a baseline mean BMI of 27.3 kg/m$^2$. Dietary intake was assessed by sets of four 24-hour dietary recalls and validated with plasma carotenoid concentrations. All ED calculations excluded beverages. Subjects in the intervention group were encouraged to maintain a daily dietary pattern that included at least 5 vegetable servings, 16 ounces (~473 ml) of vegetable juice or equivalent vegetable servings, 3 fruit servings, 30 grams of fibre (18 g/1,000 kcal), and 15–20% energy from fat. These dietary changes were reinforced through telephone counselling, monthly cooking classes, and newsletters. In contrast, the control group simply received print materials (the 1995 ‘Dietary Guidelines for Americans’ and ‘Action
Guide for Healthy Eating”) and a bimonthly maintenance newsletter with general health and nutrition information. Intervention subjects significantly reduced ED compared to controls and maintained this reduction over the 4-year study period, for cross-sectional ($p < 0.0001$) and longitudinal (group × time interaction $p < 0.0001$) analyses. However, total EI and physical activity did not vary between groups. While the intervention group had a small, significant weight loss at 1 year (group × time interaction, $p < 0.0001$), there were no weight differences observed between the intervention and control groups at the 4-year mark. As was mentioned for Raynor et al. (2012a) compensation or underreporting may have occurred in the intervention group. This study indicates that reducing ED may not produce a reduction in total EI in free-living populations, and provides impetus for more explicit guidelines when using an ED-based approach to reduce total EI for weight loss.

In a randomised controlled trial, Ello-Martin et al. (2007) investigated the effects of two dietary strategies for reducing ED on weight loss over a 1-year period. Ninety-seven obese women were assigned to one of two relatively simple treatment groups; counselled to reduce fat intake [RF group], or counselled to reduce fat intake while increasing water-rich foods, particularly fruit and vegetables [RF+FV group]. Subjects in both conditions were taught how to make food choices that were ED-reduced and appropriate in portion size. No goals for EI or fat intake were assigned, and subjects were instructed to eat ad libitum amounts of food, while following the principles of their diet. All subjects received the same behavioural therapy recommendations based on social cognitive theory (Bandura, 2004). After one year, both groups ($n=71$ study completers) had significant decreases in BW ($p < 0.0001$), however, women in the RF+FV group had a significantly different weight loss pattern compared to the RF group ($p = 0.002$). Overall, the RF+FV group lost 7.9 ± 0.9 kg while the RF group lost 6.4 ± 0.9 kg. Both groups had similar reductions in fat intake, but the RF+FV group had significantly lower ED ($p < 0.019$), while consuming a greater weight of food ($p < 0.025$) especially from fruits and vegetables ($p < 0.037$), and also reported less hunger ($p < 0.003$). In essence, subjects who
decreased the ED of their diets, by adding water-rich foods and reducing their fat intake, lost 33% more weight at 6 months, likely due to eating satisfying amounts of low ED options, compared to those who decreased ED through fat reduction alone. Frequent group and individual sessions with a dietitian likely increased dietary adherence, but ultimately, both strategies for reducing ED allowed subjects to achieve significant and clinically meaningful weight losses, over a 1-year period.

Ledikwe et al. (2007a) also examined the effects of ED in relation to BW over 6 months in a secondary analysis of the large multicentre PREMIER trial. The PREMIER trial focused on pre-hypertensive and hypertensive patients and involved dietary interventions tailored to address these conditions (Svetkey et al., 2003). Subjects (n=658) were randomly assigned to one of three groups: the established group received an 18-session intervention of well-established hypertension recommendations (weight loss, sodium reduction, and physical activity); the established+DASH group received an 18-session intervention plus implementation of the DASH diet; and the advice group received one session on these topics. The DASH diet encouraged increased consumption of fruit and vegetables (9-12 servings/day), low-fat dairy products (2-3 servings/day) and a reduced intake of fat (<25% of energy), characteristic of low ED dietary patterns (Karanja et al., 1999). The established+DASH group had the greatest reduction in ED and the greatest increase in the total weight of food consumed. When data for the intervention groups were combined, weight loss for all subjects at 6 months was significantly correlated with lower ED (r = 0.28, p < 0.001). When analysed by ED tertiles, subjects in the highest tertile (i.e. the largest ED reduction) lost significantly more weight (5.9 kg), compared to those in both the middle (4.0 kg) and lowest (2.4 kg) tertiles. Subjects in the highest and middle ED-reduction tertiles also increased the total weight of food consumed (by 300 and 80 g/day, respectively), while decreasing their overall EI (by 500 and 250 kcal/day, respectively). In contrast, those in the lowest ED-reduction tertile decreased the total weight of food consumed (by 100 g/day) with negligible changes to EI. The highest and middle tertiles
also had positive changes in dietary quality, increasing their fruit, vegetable, vitamin, and mineral intakes. The data strongly suggests that a modest reduction in overall ED is an effective weight-management strategy. It is likely the established+DASH group, who were encouraged towards increased consumption of fruit, vegetables, and low-fat dairy products, had greater dietary satisfaction and long-term compliance. The findings of this study are in agreement with other longitudinal studies, which have found changes in ED to be the strongest predictor of weight loss (Ello-Martin et al., 2007; Greene et al., 2006; Ledikwe et al., 2007a; Rolls et al., 2005a).

Rolls et al. (2005a) conducted a 1-year parallel-group trial to test the effects of a diet incorporating one or two daily servings of iso-caloric foods on satiety and weight loss. Two hundred overweight and obese men and women followed an exchange-based, energy-restricted diet, and were randomised to one of four conditions: one or two servings of low ED soup; two servings of a high ED dry snack food; or no special food (control group). All conditions exhibited significant weight loss at 6 months, which was sustained at 12 months. However, the extent of weight loss differed by group ($p = 0.006$); at 1 year, weight loss in the control (8.1 ± 1.1 kg) and two-soup (7.2 ± 0.9 kg) groups was significantly greater than the two-snack group (4.8 ± 0.7 kg), while weight loss in the one-soup group (6.1 ± 1.1 kg) did not differ significantly from other groups. Overall, weight loss was significantly correlated with decreased ED from baseline at 1 and 2 months ($p = 0.0001$), but not at 6 and 12 months; likely the result of reduced compliance over time. Nonetheless, the trial demonstrated that consuming two servings of soup daily led to greater weight loss than consuming the same amount of energy as two servings of a dry snack food daily. After 1 year, weight loss in the two-soup group was 50% greater than that in the dry snacks group (7.2 vs. 4.8 kg). These results indicate that regular consumption of low ED foods, and substitution of high ED for low ED options, can be effective strategies for increasing satiety and facilitating weight loss.
Lowe et al. (2008) investigated two approaches to weight loss maintenance, in a group of 103 women who lost weight initially on a meal replacement-supplemented diet. Women were subsequently randomised to one of three conditions for a 14-week maintenance phase: a cognitive-behavioural treatment [CBT] control group \((n=35)\); CBT with an enhanced food monitoring accuracy [EFMA] \((n=35)\) programme; or both interventions combined plus a reduced ED eating programme [REDE] \((n=33)\). Outcome measures included BW and self-reported dietary EI, taken periodically throughout the 18-month intervention. For this study, ED was calculated using two methods: ‘Foods Only’ and ‘Foods + Caloric Beverages’ (>20 kcal/serve). Self-monitoring of food intake, such as that used in the ‘EMFA’ programme, has been found to be one of the most consistent methods of weight control (Baker & Kirschenbaum, 1998; Boutelle & Kirschenbaum, 1998; Kirschenbaum, Germann, & Rich, 2005). Therefore, it was hypothesised the EFMA+REDE group would have the least weight regain, due to the reinforcement of self-monitoring, combined with a low ED diet providing higher satiety on fewer kilojoules. Subjects lost an average of 7.6 ± 2.6 kg or 8.8% during the initial weight loss phase; a statistically significant decrease compared to baseline weights \((p < 0.001)\). Following this, the EFMA intervention proved unsuccessful in improving food-monitoring accuracy. The REDE group decreased ED more than the other conditions, however, neither the REDE nor the EFMA groups showed any advantage in weight loss maintenance compared to the control group. In fact, subjects in all treatment conditions regained weight between the 6-month and 18-month follow-ups, and of the study completers at the 18-month follow-up, 41.9% regained all the weight lost originally. Furthermore, between post-intervention assessment and 6-month follow-up, ED for the REDE group rebounded to values equivalent to the other two groups. The unexpected results of this study may be partially explained by the after-effects of the LCD weight-loss phase (Optifast™ meal replacement system), which supplied a mere 1100 kcal/day to subjects. LCDs and VLCDs are associated with rebound weight regain (Lasker, 1947) and it is possible that weight maintenance was adversely affected by this phenomenon. Further studies
are warranted to investigate the potential efficacy of an EFMA+REDE-style intervention on weight maintenance, following a less intensive weight loss intervention.

2.4 Guidelines for the consumption of energy-dense foods and beverages

2.4.1 National nutrition guidelines and dietary energy density

2.4.1.1 New Zealand dietary guidelines

The New Zealand MOH provides evidence-based nutrition guidelines in the ‘Food and Nutrition Guidelines for Healthy Adults: A Background Paper’ (MOH, 2003). This comprehensive paper informs the health education pamphlet: ‘National Nutrition Guidelines for New Zealanders’ (MOH, 2013) which is often disseminated to the public by registered dietitians, GPs, and various health bodies including The National Heart Foundation. These national guidelines include quantified recommendations, with corresponding examples of serving sizes, for foods and beverages from the four main food groups: ‘Vegetables and Fruits’, ‘Breads and Cereals’, ‘Milk and Milk Products’, and ‘Lean Meats, Chicken, Seafood, Eggs, Legumes, Nuts and Seeds’. However, there are no quantified recommendations for the consumption of energy-dense, nutrient-poor foods. Such foods can be found within each of the four main food groups, as well as ‘other’ food categories, such as ‘snack foods’ and ‘pre-prepared foods’. The MOH does however provide generic recommendations relating to energy-dense, nutrient-poor foods as follows:

Prepare foods, or choose pre-prepared foods, drinks, and snacks: With minimal added fat, especially saturated fat; that are low in salt, and if using salt, choose iodised salt; with little added sugar, e.g. limit your intake of high-sugar foods.

(Adapted from MOH, 2003, p. 4)

Additionally, a section describes alcohol as being energy-dense, and likely to contribute to weight gain (MOH, 2003). Hence, their recommendation is:
If choosing to drink alcoholic beverages, limit your intake.

(Adapted from MOH, 2003, p. 4)

These statements are reiterated in the publicly accessible ‘Eating for Healthy Adults’ booklet (MOH, 2013).

2.4.1.2 American dietary guidelines

The USA has equivalent evidence-based national nutrition guidelines, known as the ‘Dietary Guidelines for Americans’ (USDA & USDHHS, 2010). Revisions to these guidelines were planned to commence during 2015. This background document informs the corresponding consumer booklet ‘Let's Eat for the Health of It’ (USDA, 2011) which incorporates the ChooseMyPlate™ model (USDA, 2015). ChooseMyPlate™ is a public health organisation established by the CNPP, a subgroup of the USDA, whose role is to promote the Dietary Guidelines for Americans. Like the New Zealand ‘Food and Nutrition Guidelines for Healthy Adults’ (MOH, 2003) the USA publications provide nutritional recommendations for main food groups, categorised slightly differently, into 6 groups: ‘Fruits’, ‘Vegetables’, ‘Grains’, ‘Protein Foods’, ‘Dairy’, and ‘Oils’. Recommendations for quantities consumed are provided in two forms; specific amounts tailored according to age group and sex (e.g. 1 cup per day), and general ‘Key Consumer Messages’ (e.g. “Make half your plate fruits and vegetables”). Unlike the New Zealand guidelines however, the USA includes a 7th food group: ‘Empty Calories’, defined as ‘calories from solid fats and/or added sugars’, and goes on to provide detailed and quantified recommendations for consumption of these foods (USDA, 2011). Hence, the USA guidelines are currently the most detailed and specific in their recommendations for energy-dense, nutrient-poor foods, compared to those of New Zealand, Australia, and the UK.

2.4.1.3 Australian dietary guidelines

The 2013 ‘Australian Dietary Guidelines’ advocate similar philosophies to the New Zealand and USA counterparts, by providing quantified recommendations for 5 food groups with
examples of servings sizes, and energy content per portion according to age group and sex: ‘Vegetables and Legumes/Beans’, ‘Fruit’, ‘Grains – mostly wholegrain and/or high cereal fibre varieties’, ‘Lean Meat and Poultry, Fish, Eggs, Tofu, Nuts and Seeds, and Legumes/Beans’, and ‘Milk, Yoghurt, Cheese and/or Alternatives – mostly reduced fat’ (NHMRC, 2013b; NHMRC, 2013c). Like the USA guidelines, the Australian guidelines also include particular reference to ‘discretionary’ foods and drinks, describing them as follows:

Discretionary choices include foods and drinks not necessary to provide the nutrients the body needs, but that may add variety to your diet. However, many of these are high in saturated fats, sugars, salt and/or alcohol, and are therefore described as energy-dense. They can be included sometimes in small amounts by those who are physically active, but are not a necessary part of the diet. Foods in this category include cakes, biscuits, confectionary, chocolate, pastries, pies, ice confections, butter, cream, and spreads which contain predominantly saturated fats, potato chips, crisps and other fatty or salty snack foods, sugar-sweetened soft drinks and cordials, sports and energy drinks and alcoholic drinks.

(Adapted from NHMRC, 2013b p. 144)

Like the New Zealand guidelines, the Australian guidelines do not provide quantified recommendations for discretionary foods and beverages, but rather, general advice to limit consumption:

Discretionary choices are not an essential or necessary part of our diet. Discretionary foods are high in kilojoules, saturated fat, added sugars, added salt, or alcohol. If chosen, they should be eaten only sometimes, and in small amounts.

(Adapted from NHMRC, 2013c p. 1)

An additional, valuable proviso is included, regarding discretionary energy:
To meet additional energy needs, extra serves from the Five Food Groups – or from unsaturated spreads and oils or from discretionary choices – may be needed, but only by those adults who are taller or more active, and not overweight.

(Adapted from NHMRC, 2013c p. 2)

2.4.2 Governmental and international clinical guidelines for the management of overweight and obesity in adults

In addition to national dietary guidelines, many countries now assemble dedicated expert groups, tasked with developing evidence-based reports, concerning best practice and clinical guidelines for the prevention and treatment of obesity. The MOH developed the ‘Clinical Guidelines for Weight Management in New Zealand Adults’ (MOHCTRU, 2009). Overall, the two key points regarding dietary approaches for weight loss are:

Firstly, reduce total energy intake (by decreasing the overall consumption of foods and beverages), and secondly, modify the types of foods consumed (e.g. by reducing the proportion of fat in the diet).

(Adapted from MOHCTRU, 2009 p. 39)

The report went on to analyse various studies of dietary approaches to weight loss. The approaches were divided into 4 main types: ‘Low Energy’ (4200-6720 kJ/day); ‘Very Low Energy’ (< 4200 kJ/day); ‘Low Glycaemic Index/Load’; and ‘Modified Macronutrient’, which comprised 5 subcategories: 1. ‘Low Carbohydrate’ (≤ 40% TE from carbohydrate); 2. ‘Low fat’ (≤ 10% TE from fat); 3. ‘High Protein’ (≥ 35% TE from protein); 4. ‘High Carbohydrate’ (≥ 65% TE from carbohydrate); and 5. ‘New Zealand Healthy Eating Diet’ (50-55% TE from carbohydrate, 20-35% TE from fat, and 15-25% TE from protein, with no specific energy restrictions). Evaluation and meta-analyses of the studies found all four dietary approaches were deemed similar in their effectiveness for weight loss provided they produced a reduction in overall energy intake. All approaches produced mean weight losses of around 4 kg over 12
months (ranging from weight maintenance to greater than 10 kg loss). Evidence statements for each of the four dietary approaches were as follows:

- Very low energy diets (including those incorporating meal replacements) increase weight loss in overweight and obese people by -3.8 kg (standard deviation 6.3 kg) over 12 months compared with the control.
- Low glycaemic index/load diets increase weight loss in overweight and obese people by -1.0 kg (95% CI -0.1 kg to -1.9 kg) compared with high glycaemic index diets. Low glycaemic index/load diets produce weight losses of -4 kg to -12 kg over 12 months.
- All types of modified macronutrient diets (low carbohydrate, low fat, high protein, high carbohydrate, and the New Zealand Healthy Eating diet) are similarly effective for weight loss. All modified macronutrient diets produce weight losses of about 4 kg over 12 months.
- All types of diets (low energy, very low energy, low glycaemic index/load, and modified macronutrient) are similarly effective for weight loss and produce weight losses of about 4 kg over 12 months. However, weight lost ranged from weight maintenance to a loss of more than 10 kg over 12 months.

(Adapted from MOHCTRU, 2009 p. 48-49)

Studies of energy density and weight loss were not evaluated per se, though it is likely each approach led to indirect reductions in energy density, as a natural consequence of the dietary changes required. This supposition is supported by statements made within the ‘Lifestyle Approach’ section of the publication, which promotes a ‘Food, Activity and Behavioural-based’ approach. Recommendations concerning energy-dense, nutrient-poor foods (including those related to high-saturated fat and high-sugar foods, since they are usually energy-dense), are outlined below:
Encourage smaller portion sizes, particularly of energy-dense foods:

- Reduce fat intake, especially saturated fats, by eating low-fat dairy products; eating lean meat cuts and avoiding all manufactured meat products; substituting margarine for butter and lard; using low fat cooking methods, such as grilling and baking; and removing skin from chicken and trimming fat from meat.
- Reduce as much as possible and try to avoid energy-dense takeaways, fast foods and fried foods.
- Reduce as much as possible and try to avoid energy-dense snacks, e.g. potato chips, snack bars, buttered popcorn, biscuits, cake, and ice cream.
- Reduce as much as possible and try to avoid sugary drinks, e.g. fizzy drinks, fruit juice, sports drinks, and flavoured drinks/cordials.

(Adapted from MOHCTRU, 2009 p. 32-33)

Further behavioural-based recommendations regarding stimulus control and energy-dense foods were:

Keep energy-dense foods out of the house, by clearing high-energy foods out of kitchen cupboards and the fridge, and substituting high-energy foods with healthier options.

(Adapted from MOHCTRU, 2009 p. 58)

Similarly, the Australian NHMRC have evidence-based ‘Clinical Practice Guidelines for the Management of Overweight and Obesity in Adults, Adolescents and Children in Australia’ (NHMRC, 2013a). The guidelines acknowledge that long-term weight management is challenging, due to strong physiological responses that increase hunger and encourage weight gain. This statement reinforces the importance of finding strategies to enhance satiety, such as low energy-dense approaches, as discussed in section 2.4.1. The Australian clinical guidelines
attribute positive energy balance and weight gain to excess consumption of foods and beverages high in fat or sugar (such as snack foods, fast foods, junk foods, soft drinks) and low intakes of low-energy foods (such as vegetables and fruit). In terms of approaches for reducing TE for weight loss, the guidelines advocate the following:

To reduce energy intake and lose weight, reduce (rather than restrict) intake of foods that are high in energy (e.g. fats, sugar), and increase intake of foods that are low in energy but rich in other nutrients (e.g. vegetables, fruit).

(Adapted from NHMRC, 2013a, p.32)

The Australian clinical guidelines add that behavioural change is central to successful weight management. Their recommendations include the following:

As behavioural change is fundamental to weight management, it may be a more appropriate short-term goal than weight loss itself, particularly for people who find weight loss difficult. Examples of behavioural change goals include:

- Reduced intake of energy-dense foods.
- Regular eating (including breakfast).
- Reduction in ‘non-hungry’ eating (e.g. snacks).
- Increased daily steps taken when walking.
- Increased days a week of planned physical activity.

(Adapted from NHMRC, 2013a, p.58)

The publication also points out that limited understanding of high-energy versus low-energy foods is a barrier to changing health behaviours. This assertion supports the need for clear, simplified information, regarding the relative energy density of various foods and beverages.
2.4.3 NICE guidelines

NICE, a Britain-based non-governmental public health body, developed clinical guidelines entitled ‘Obesity: Guidance on the Prevention, Identification, Assessment and Management of Overweight and Obesity in Adults and Children’ (NICE, 2006). While these guidelines make numerous statements about the need to reduce energy intake for weight loss and maintenance, they contain no reference to energy density, discretionary calories, or empty calories. The guidelines do however outline strategies to assist people in achieving and maintaining a healthy weight; referring to energy density indirectly through these messages:

- Eat at least five portions of a variety of fruit and vegetables each day, in place of foods higher in fat and calories.
- Eat a low-fat diet and avoid increasing your fat and/or calorie intake.
- Eat as little as possible of: Fried foods; drinks and confectionery high in added sugars; and other food and drinks high in fat and sugar, such as some take-away and fast foods.
- For adults, minimise the calories you take in from alcohol.

(NICE, 2006, p.53)

2.4.4 NHLBI and NIDDKD guidelines

The USA NHLBI and NIDDKD produced the ‘Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults’ (NHLBI & NIDDK, 1998). The document acknowledges there is an overabundance of palatable, energy-dense foods in the USA, posing a negative environmental influence on the prevalence of overweight and obesity. The publication advocates a LCD of 800 to 1500 kcal/day as the ideal dietary therapy for weight loss in overweight patients, and provides the following corresponding evidence statement:

For overweight and obese persons, LCDs can reduce total body weight by an average
of 8% and help reduce abdominal fat content over a period of around 6 months.

(NHLBI & NIDDKD, 1998, p. 42)

The recommended strategies for achieving negative energy balance include educating patients in the following areas:

- Energy value of different foods.
- New habits of purchasing – giving preference to low-calorie foods.
- Avoiding overconsumption of high-calorie foods (both high-fat and high-carbohydrate foods).
- Limiting alcohol consumption.

(NHLBI & NIDDKD, 1998, p. 74-75)

2.4.5 WHO and UNFAO

WHO and UNFAO collaborated to develop the technical report ‘Diet, Nutrition and the Prevention of Chronic Diseases’ (WHO, 2003). The report includes recommendations for preventing excess weight gain, obesity, and obesity-related diseases. In the commentary regarding strength of evidence statements, WHO states:

There is a causative relationship between high intakes of energy-dense micronutrient-poor foods, i.e. there is convincing evidence that a high intake of energy-dense foods promotes weight gain. In high-income countries (and increasingly in low-income countries) these energy-dense foods are not only highly processed, but also micronutrient-poor, further diminishing their nutritional value. Energy-dense foods tend to be high in fat (e.g. butter, oils, and fried foods), sugars or starch, while energy-dilute foods usually have high water content (e.g. fruits and vegetables).

(Adapted from WHO, 2003, p. 64)
The report reiterated that laboratory studies support the view that passive overconsumption of total energy occurs when dietary energy density is high. Also, the report affirmed a moderately strong level of causative evidence for high intakes of sugar-sweetened soft drinks and fruit juices and increased risk of obesity. In reviewing observational studies, the report stated high intakes of free sugars in beverages promote weight gain, due to distinctly different physiological effects of energy within solid foods compared to fluids, in terms of satiation and satiety. This effect is attributed to reduced gastric distension and faster transit times, which means energy from free sugars in fluids are less well detected by the body, leading to insufficient energy compensation. The report concludes that dietary patterns characterised by low energy density are an effective general strategy for obesity prevention:

The fat and water content of foods are the main determinants of the energy density of the diet. So, a lower consumption of energy-dense (i.e. high-fat, high-sugars and high-starch) foods and energy-dense (i.e. high free sugars) drinks contributes to a reduction in total energy intake. Conversely, a higher intake of energy-dilute foods (i.e. vegetables and fruits), and foods high in non-starch polysaccharides; a form of dietary fibre (i.e. wholegrain cereals) contribute to a reduction in total energy intake, and an improvement in micronutrient intake. It should be noted though, that very active groups who have diets high in vegetables, legumes, fruits and wholegrain cereals, may sustain a total fat intake of up to 35% without the risk of unhealthy weight gain.

(Adapted from WHO, 2003, p. 70)

Collectively, the clinical guidelines for weight management strongly advocate a general reduction in energy-dense, nutrient-poor foods and beverages. However, there are no specific or quantified recommendations made, which may make it difficult for the lay public to successfully interpret and implement recommendations effectively. While endorsements are
made for dietary approaches that facilitate negative energy balance, an approach which likely induces a reduction in dietary energy density, it would be beneficial for national health bodies to include analyses specifically of energy density based approaches to weight loss, within future versions of clinical guidelines for obesity management.

2.4.6 Dietetic association’s best practice guidelines for the management of overweight and obesity in adults

In addition to publications from governmental and non-governmental health bodies, professional Dietetic associations also provide evidence-informed guidelines for management of overweight and obesity. The DAA in Australia produced ‘Best Practice Guidelines for the Treatment of Overweight and Obesity in Adults’ (DAA, 2012). These guidelines were based upon systematic reviews and literature reviews (conducted from 2003 to December 2010) of various dietary interventions for overweight and obese adults, namely: Energy restriction; Modification of fat composition; Modification of carbohydrate composition including glycaemic index and glycaemic load; Modification of calcium/dairy intake; and Behavioural/psychological approaches to support dietary interventions. Based upon their analyses, three key recommendations achieved ‘Level A Evidence’ (the highest level of evidence; trusted to guide dietetic practice), as follows:

- In overweight and obese adults, recommending a very low carbohydrate diet (20g to no more than 40g per day with no energy restriction) is not more effective than recommending an energy restricted diet, in achieving weight loss in durations of 1 to 5 years.

- Achieving a reduction in energy intake, by incorporating meal replacements that are monitored by health professionals, provides greater weight loss in overweight and obese adults than general dietary advice, for periods of time varying from 1 to 12 months.
A higher fat / lower carbohydrate diet (30-75% total energy from fat, 4-45% total energy from carbohydrate) is equally as effective in achieving weight loss in overweight and obese adults as a higher carbohydrate / lower fat diet (20-25% total energy from fat, 50-65% total energy from carbohydrate), for periods of time varying from 6 to 16 weeks, when protein intake and the level of energy intake are held constant. (Adapted from DAA, 2012, p. 12).

Essentially, these evidence statements affirm that irrespective of the particular dietary method, energy restriction is the fundamental determinant of weight loss and maintenance. As alluded to previously, it is likely these energy restricted dietary approaches are causing concomitant reductions in energy density. However, further research is required, to specifically examine low energy-dense approaches against standard dietary approaches for weight loss. Furthermore, it is advisable to include evaluations of satiety and adherence relating to each dietary approach within future evidence statements, as these factors are central to long-term weight management.

2.4.7 ADA position statement

In lieu of clinical guidelines, the American Dietetic Association published the ‘Position of the American Dietetic Association: Weight Management’, based upon the ADAs Evidence Analysis Process (Seagle, Strain, Makris, & Reeves, 2009). The document concluded that a low fat, reduced-energy diet is the most thoroughly studied weight-loss dietary strategy, and as such, is most frequently recommended by health professionals and authorities. The ADA emphasises that fat is the densest macronutrient energy-wise, while having weak effects upon satiation and satiety. They acknowledge the inherent challenge of moderating dietary intake of energy-dense foods:

Consistently choosing a low-energy, nutritious diet, within an environment that provides a surplus of highly palatable, energy-dense and nutrient-poor food choices,
can easily overwhelm anyone trying to lose weight.

(Adapted from Seagle et al., 2009, p. 335).

The ADA stipulates that negative energy balance is fundamental to achieving weight loss, and recommends a sustainable reduction of 500 to 1000 kcal/day (~2000-4100 kJ) to achieve a 1-2 pound (~0.5-0.9 kg) weight loss per week. Suggested energy reduction strategies include: Reducing energy intake; reducing consumption of fats and carbohydrates; reducing consumption of energy-dense choices; and in special circumstances, the use of meal replacements or LCD/VLCD approaches. Overall, to achieve weight loss, the ADA concludes:

There is ‘strong and imperative’ evidence to support an individualised reduced-calorie diet, as the basis of the dietary component of a comprehensive weight management programme. Reducing dietary fat and/or carbohydrates is a practical way to create a caloric deficit of 500 to 1000 kcal below estimated energy needs, and should result in a weight loss of 1 to 2 lb. per week.

(Adapted from Seagle et al., 2009, p. 333-334).

In summary, recommendations from national dietetic bodies reiterate those of governmental, non-governmental, and international health organisations, by endorsing low energy-dense dietary patterns.

2.5 Participants’ qualitative evaluations of nutrition education materials or programmes for weight loss

The majority of literature evaluating the efficacy of nutrition education materials or weight loss programs is quantitative in nature (Fade, 2003; Broom & Willis, 2007). These quantitative studies focus on outcome variables, that is, the degree of change between pre- and post-intervention measures, such as changes in BMI or weight, changes in dietary intakes, or changes in nutrition knowledge, attitudes and behaviours (Guthrie, 1994).
Qualitative data, on the other hand, investigates *process* variables; factors that occur in-between, and therefore act upon, the pre- and post-intervention measurements (Patton, 2002). Where quantitative data investigates what was achieved, qualitative data explores the reasons why particular outcomes were or were not attained. Therefore, qualitative research is well placed to answer more complex questions about food-related behaviour, because it investigates how and why individuals act in certain ways (Swift & Tischler, 2010). The remaining portion of this literature review examines this latter type of research.

Six qualitative studies were selected to be included in this review (Gallagher, Kirkness, Armari, & Davidson, 2012; Allan, Hoddinott, & Avenell, 2011; Herriot, Thomas, Hart, Warren, & Truby, 2008; Adolfsson, Carlson, Undén, & Rössner, 2002; Morgan, Warren, Lubans, Collins, & Callister, 2011; Bidgood & Buckroyd, 2005). These studies were selected because, like the current thesis, they explored participants’ evaluations, as opposed to researchers’ evaluations, of nutrition education materials or weight loss programmes, with a view to enhancing or further developing the particular programme. Gallagher, Kirkness, Armari, and Davidson (2012) examined participants’ perspectives of a multi-component weight loss supplement to a cardiac rehabilitation programme, ‘Healthy Eating and Exercise Lifestyle Programme’. Allan, Hoddinott, and Avenell (2011) compared and contrasted leaders’ and attendees’ experiences of both health service and commercial weight loss groups. Herriot, Thomas, Hart, Warren, & Truby (2008) conducted a supplementary qualitative arm of a larger randomised controlled trial that investigated four popular UK-based commercial weight loss programmes. The qualitative study evaluated participants’ previous dieting experiences, motivations for enrolling in the ‘Diet Trails’ study, and experiences of following allocated dietary conditions. Adolfsson, Carlson, Undén, and Rössner (2002) sought to identify factors that obese individuals considered important in relation to eating habits and weight change, in a 1-year weight reduction programme conducted at a primary health care centre. Morgan, Warren, Lubans, Collins, and Callister (2011) evaluated males’ perceptions and experiences of a men-only lifestyle
programme, ‘Self-Help, Exercise, Diet and Information Technology’. A final qualitative study by Bidgood and Buckroyd (2005) was not affiliated with a concurrent weight loss programme; the researchers simply sought to explore obese adults’ historical accounts of past attempts to lose weight.

2.5.1 Motivations for actively seeking to lose weight

Three of the six studies gathered information on participants’ motivations for losing weight (Gallagher et al., 2012; Herriot et al., 2008; Morgan et al., 2011). Herriot et al. (2008) identified participants’ main intrinsic motivators for enrolling in the ‘Diet Trials’ study as a lack of self-esteem and confidence and the opportunity to be part of an academic weight loss study. The authors noted reducing health risks was not a key motivator within the group studied. Gallagher et al. (2012) evaluated a weight loss programme specifically tailored to cardiac rehabilitation for participants diagnosed with CVD (77%) and/or NIDDM (49%). Emerging themes from participants’ responses during focus groups included ‘the process of recognizing and deciding to make a commitment to managing their weight’.

Relatedly, participants were motivated to join the HEELP weight loss programme after receiving a personal invitation, from an expert health professional affiliated with the cardiac rehabilitation or diabetes education programmes (Gallagher et al., 2012). Participants reported this person was someone whom they trusted and had established rapport with, and they considered this relationship crucial to initiating their weight loss efforts. While some participants felt confronted by the personal invitation, as it confirmed they were overweight and ‘at risk’ of cardiac episodes, the offer ultimately encouraged them to make a commitment to losing weight.

Morgan et al. (2011) was the only study of the six that comprised men only (n=18). Results indicated men were attracted to the programme because they perceived it would not require extensive time commitments, was tailored specifically to men, and allowed for the inclusion of
‘treat’ foods and drinks. Men valued the humour that was deliberately incorporated into recruitment advertising, leading respondents to form an opinion of the SHED-IT programme as being achievable and sustainable, rather than overly strict or regimented. Men were also motivated to take part in response to a personal weight-related health issue (e.g. high blood pressure) and physical appearance issues (e.g. being disturbed by the sight of their large stomach).

2.5.2 Previous experiences with weight loss

Five of the six studies explored participants’ previous experiences of weight loss in some capacity (Adolfsson et al., 2002; Allan et al., 2011; Bidgood & Buckroyd, 2005; Herriot et al., 2008; Morgan et al., 2011). Herriot et al. (2008) found participants had previously attempted all four of the commercial diets tested in the ‘Diet Trails’ study: Atkins Low Carb Diet™, Weight Watchers™, SlimFast™, and Rosemary Conley™. Additionally, participants had tried Silhouette Slimming Club™, the Cambridge Diet™, the Scarsdale Diet™, the Beverly Hills Diet™, the Cabbage Soup Diet™, and other approaches involving supplements and alternative medications. Adolfsson et al. (2002) found three of their fifteen participants had previously only ever tried Weight Watchers™; five had attempted Weight Watchers™ and other methods, while seven had only tried methods other than Weight Watchers™.

All eighteen participants of Bidgood and Buckroyd (2005) had previously tried dieting; most had lost weight and either regained the lost weight, or regained more weight than originally lost. Many had undergone repeated dieting attempts and concomitant weight-cycling. Participants in Bidgood and Buckroyd (2005) identified Weight Watchers™ as the most commonly attempted weight-reducing method, followed by Rosemary Conley™, Slimming World™, and slimming tablets.

Morgan et al. (2011) found that male participants in the SHED-IT programme had previously tried structured weight loss plans, meal replacements, or over-the-counter preparations such as
fat burning tablets. The men often described these methods as ‘quick-fixes’, producing short-term or unmaintainable weight loss, because they were overly restrictive, or based on supplements, which could not be taken long-term.

The study by Allan et al. (2011) explored experiences of both participants and leaders of both commercial-based and health service-based weight loss groups. Among the participants ($n=22$) sixteen had attended several commercial weight loss groups, ten had attended a health service-based weight loss intervention (either one-to-one or group), and three had taken part in ‘other’ weight loss programmes.

### 2.5.3 Exercise and activity-based weight reduction methods

Two of the six studies enquired whether participants had previously adopted or increased physical activity in order to lose weight (Bidgood & Buckroyd, 2005; Herriot et al., 2008). Herriot et al. (2008) found participants had previously endeavoured to increase exercise and incidental activity, by attending a gym, aerobics classes, swimming, cycling, or walking. Bidgood and Buckroyd (2005) found the majority of their eighteen participants had taken up exercise at various times. The most popular forms reported were walking and swimming.

### 2.5.4 Keys to successful weight loss

Herriot et al. (2008) investigated participants’ experiences and outcomes of following four individual dietary regimens (Atkins™, Weight Watchers™, SlimFast™, Rosemary Conley™). Thirty-nine obese participants participated in baseline and post-intervention focus groups. Herriot et al. (2008) found that motivators could be characterised as either internally or externally focused. The most successful dieters post-intervention most often cited internal motivators, such as increased self-efficacy and self-esteem resulting from their success in losing weight. Those who successfully lost weight were also noted to display a shift in attitude, from a temporary ‘dieting’ mentality, to one of permanent and sustainable lifestyle change.
2.5.5 Barriers to successful weight loss

Adolfsson et al. (2002) aimed to explore factors associated with eating habits and weight change in overweight and obese participants, during a one-year lifestyle and weight reduction programme delivered through a primary health care setting. The researchers presupposed that excessive eating might have an emotional and psychosocial function for some individuals. The programme comprised educational sessions and behaviour change exercises to assist participants in developing their own meal plans, with lunches and dinners based upon the Swedish Plate Model (NFAS, 2015). Fourteen participants, with a BMI ranging 29-40 kg/m$^2$, were individually interviewed at four time points throughout the intervention. At interview four (one year post intervention) two participants had lost >5% of their original body weight, six participants had gained weight since commencing the intervention, and eleven participants had gained weight since the intervention phase terminated. Fourteen of the fifteen participants described factors other than physical hunger as having a negative influence on their eating habits, including stress, need for affinity, depression, worry, and tiredness. Adolfsson et al. (2002) concluded that unless emotional and other factors associated with eating habits in overweight/obese individuals are addressed, the treatment needs are never permanently met.

2.5.6 Positive aspects of tailored weight loss programmes and commercial diet programmes

Four of the studies evaluated concurrent weight loss programmes and sought feedback from participants on the positive aspects of dietary interventions (Allan et al., 2011; Gallagher et al., 2012; Herriot et al., 2008; Morgan et al., 2011). The HEELP programme, a multi-component, group-based, weight loss supplement to a cardiac rehabilitation programme, aimed to establish behaviour change by promoting regular exercise, healthy eating and positive problem solving. Gallagher et al. (2012) reported a distinctive strength of the HEELP programme from the participants’ perspective, was that it was developed and led by appropriate health professionals,
and tailored to their condition. Hence, participants received weight loss advice and exercise recommendations designed to adequately and safely address CVD risk factors.

The SHED-IT trial (Morgan et al., 2011) developed and pilot-tested a male-targeted weight loss programme. The SHED-IT ‘Internet Group’ involved a face-to-face information session on weight loss, instruction in the use of a calorie counting website (CalorieKing™), a weight loss guide (‘Weight Loss Handbook for Blokes’), and on-going online support. An ‘Information Only’ control group received face-to-face information sessions on weight loss and the ‘Weight Loss Handbook for Blokes’. Both groups highly valued the initial information session, particularly the clarity and simplicity of messages pertaining to ‘energy in/energy out’. While the weight loss handbook was deemed less popular than the information session, participants from both groups still reported finding it useful, informative and motivating, due to the clear instructions on what to do, information regarding healthy food choices, and guidance on calculating basal metabolic and energy requirements. When comparing experiences of the SHED-IT trial to previous weight loss experiences, participants reported SHED-IT enabled them to identify barriers to weight loss not previously considered. These were a lack of knowledge regarding negative energy balance for weight loss, lack of insight into reasons for failure to lose weight or keep it off, lack of discipline, blaming external factors for weight gain, and lack of time to exercise. Overall, respondents reported feeling empowered through the increased knowledge, and highly satisfied with the inherent humour and simplicity of the programmes key messages. Men also valued the flexibility of the programme, which did not advocate a restrictive or overly strict dietary or exercise structure, thus allowing for inclusion of ‘treat’ foods and beverages, and promoting incidental rather than regimented physical activity.

Herriot et al. (2008) noted the ‘pros’ cited by participants tended to correspond with the promotional aspects of the applicable company. For example, the ability to eat high-fat foods freely (Atkins™), the philosophy that no food is banned (Weight Watchers™), meal
replacements being convenient and quick (SlimFast™), and the plan being easy to follow and stick to (Rosemary Conley™).

Allan et al. (2011) compared and contrasted weight loss programmes delivered by health service providers and commercial organisations, from the perspective of both leaders and attendees. They found health service-based weight loss groups provided more specialist group content and experiences, particularly for those with chronic diseases, and for populations less likely to attend commercial groups such as men.

2.5.7 Negative aspects of tailored weight loss programmes and commercial diet programmes

Morgan et al. (2011) reported more face-to-face contact was a common suggestion for improving the SHED-IT programme, especially from those in the Information Only (control) group, and those who were less successful in losing weight. Herriot et al. (2008) reported participants identified disadvantages of their allocated diet, such as experiencing minor initial side effects (Atkins™), being overly time consuming to buy and prepare suitable foods (Weight Watchers™), requiring too much self-discipline or being incompatible with social eating (SlimFast™), and being high maintenance to check food labels and expensive overall (Rosemary Conley™). Additionally, Herriot et al. (2008) noted most participants following the Atkins™ and SlimFast™ Diets expressed an intention to cease the diet immediately post-intervention.

When comparing commercial and health service-based groups, Allan et al. (2011) found leaders of health service weight loss groups had less opportunity for supervision, peer support, or specific training in how to run their groups, compared to leaders of commercial weight loss programmes.
2.5.8 Recommendations for improvements

Four of the six studies obtained feedback from participants regarding how to improve weight loss programmes (Adolfsson et al., 2002; Bidgood & Buckroyd, 2005; Gallagher et al., 2012; Morgan et al., 2011). Based on participants’ verbal feedback and weight loss outcomes, Adolfsson et al. (2002) recommended the addition of a ‘motivational phase’ within lifestyle intervention programmes, including an evaluation of problem behaviours, and a preparation for change period to precede implementation of changes. Researchers suggested this might address the emotional factors, and reasons other than physical hunger, commonly associated with excessive eating in overweight/obese individuals. Additionally, Adolfsson et al. (2002) suggested a period of supported maintenance, to allow for emotional and practical adjustment to dietary and lifestyle changes, thus solidifying new habits. Similarly, Bidgood and Buckroyd (2005) suggested counselling could play a greater role in the treatment of obesity, to explore issues such as the psychological use of food, low self-esteem, and body image dissatisfaction, in relation to eating and lifestyle habits.

Gallagher et al. (2012) reported some participants of the HEELP group requested advanced options for physical activity, additional to the structured exercise sessions offered through participating gyms. Participants also expressed the need for support during programme breaks, especially for maintaining motivation. However, the authors countered that helping participants plan and prepare for such breaks would be more feasible. Additionally, HEELP participants commonly requested the inclusion of spouses/partners in group-based information sessions, to benefit spouses/partners in their ‘support role’ and as individuals.

Morgan et al. (2011) noted SHED-IT Internet Group compliers (who self-monitored through the study website as instructed) maintained greater weight losses at 12 months (−8.8 kg; 95% CI −11.8, −5.9) compared to non-compliers (−1.9 kg; 95% CI −4.8, 1.0) and controls (−3.0 kg; 95% CI −5.2, −0.9). Hence, the authors proposed employing strategies to improve web compliance in future, including modifying the web environment to suit men’s preferences
(stronger tailored messages rather than discussion boards/forums) and streamlining the processes around online recording of dietary intake and physical activity.

2.6 Summary of literature quality and strength of evidence

2.6.1 Terms, definitions and classifications for dietary energy density

The variety of literature in this subject area clearly demonstrates the growing interest and need for standardised definitions, rankings, or classification systems for energy density and nutrient density. While the individual studies of various nutrient profiling systems reviewed are of fair to good quality, further studies are required to test the relative efficacy and validity of such systems, with collaboration between researchers and health organisations. On this note, WHO is currently working with international experts and partners to develop or adapt proposed nutrient profile models, in order to harmonise nutrient profiling development, and produce consistent and coherent public health nutrition messages (WHO, 2016).

2.6.2 Dietary energy density, body weight, and weight management for obesity

Overall, the body of literature regarding energy density and body weight is extensive, and the majority of studies conducted are well designed, well controlled, and of good to high quality. Collectively, the literature clearly demonstrates dietary patterns characterised by reduced energy density are positively associated with decreased total energy intake, increased dietary quality, enhanced satiety, weight loss, and lower body weight. However, considering the complexity and multifactorial nature of obesity, further intervention studies are needed, particularly to clarify and distinguish the independent effects of energy density relative to nutrient density, in the dietary treatment of obesity.

2.6.3 Recommendations from official health bodies regarding energy density

The processes for developing New Zealand Food and Nutrition Guidelines are rigorous and systematised, utilising robust and appropriate methodologies, to evaluate the most recent nutritional evidence (MOH, 2015b, MOH, 2015c). In developing the 2015 New Zealand
‘Eating and Activity Guidelines’ (which recently superseded the 2011 ‘Food and Nutrition Guidelines’ discussed in section 2.4.1.1) the MOH and Technical Advisory Group considered and evaluated all relevant nutritional evidence from similar countries and international organisations. This process facilitated the development of recommendation statements, which underwent stakeholder consultation, focus group testing with the public, internal review from the MOH, and various external reviews from health practitioners, non-governmental organisations, government agencies, and the food industry (MOH, 2015b, MOH, 2015c).

Similarly, the processes for developing Clinical Guidelines for Weight Management in New Zealand Adults were systematised and evidence-informed, involving expert groups and stakeholders (MOH, 2015d). The Clinical Trials Research Unit (University of Auckland) and a Technical Advisory Group developed the guidelines collaboratively, incorporating key informant interviews, pre-testing with healthcare providers and primary health organisations, consultation with Māori and Pacific committees, and literature reviews on best practices for Māori and Pasifika peoples (MOH, 2015d).

In sum, the above publications, along with all those discussed in section 2.4, are developed in ways consistent with best practice, emphasising appropriate use of evidence, to produce the highest quality of literature and strength of evidence available.

2.6.4 Participant-led evaluations of nutrition education materials and programmes designed for weight loss

The methodologies for the six qualitative studies reviewed are sound, and are aligned with best practices in qualitative evaluation (Patton, 2002). However, the overall body of research in this very specific subject area is limited. As such, further research is needed to, firstly, establish consistent and thorough methodologies for participant-led evaluations of weight loss programmes, and secondly, to build strength of evidence for the individual weight loss programmes that show potential, through multiple qualitative and quantitative studies.
3 Objective statement

In New Zealand, around 65% of the adult population are now overweight or obese. Obesity is associated with numerous non-communicable diseases. There is a large body of research which links energy-dense, nutrient-poor foods to increased energy intakes, lowered dietary quality, increased BMI, and obesity. However, translating this research into usable advice is an on-going challenge in dietetic practice. The NEEDNT Food List™, comprising non-essential, energy-dense, nutritionally-deficient foods and beverages, was created to assist overweight and obese people to easily identify foods which are usually high in energy and lacking nutritional benefits, or easily replaced by lower energy, more nutritious alternatives. The goal of the present research was to qualitatively evaluate the usability and appeal of preliminary Moderation Guidelines, which aim to facilitate implementation of the NEEDNT concept.

3.1 Objectives for empirical research

Objective 1: To create a points and quota system for quantifying and monitoring energy intake from NEEDNT foods and beverages, to form the technical basis of preliminary NEEDNT Foods Moderation Guidelines.

Objective 2: To pre-test the usability and appeal of preliminary Moderation Guidelines, by qualitatively evaluating participants’ feedback and experiences of the Moderation Guidelines, while considering insights relevant to weight loss and dietary moderation, among a representative group of potential future users.

Objective 3: To make recommendations to further develop preliminary Moderation Guidelines, into a fully revised and comprehensive tool for facilitating weight loss and improving dietary quality in obese persons.
4 Participants and methods

This chapter describes the methods used to conduct the empirical research of this thesis. Throughout this chapter, the study design, ethical considerations, participant recruitment and sampling, resource development, study protocol, and data collection and analysis, are explained in detail.

4.1 Study design

This study utilised an observational design and qualitative methods to obtain information-rich, in-depth data (Patton, 2002; Edmunds & Brown, 2012). Participants’ detailed personal accounts were sought in relation to their historical experiences of weight loss, their personal understandings of the concept of dietary moderation, and importantly, their feedback and experiences of trialling preliminary Moderation Guidelines. Study participants were chosen according to specific inclusion and exclusion criteria (Appendices B, D & H; pages 183, 192 & 201) in order to represent potential future users of the Moderation Guidelines. Prior to commencing the pre-test period, participants were given a brief verbal overview of the principles underpinning the Moderation Guidelines, and basic instruction in how to use them. Participants then followed the Moderation Guidelines for a 4-week period, and subsequently participated in one-on-one, semi-structured interviews. The collective qualitative interview data were evaluated by thematic analysis using a general inductive approach.

4.2 Māori consultation

Consultation with Māori was initiated through the Ngai Tahu Research Consultation Committee, in keeping with University of Otago regulations. The Committee’s response approving the proposed research project was received in May 2010, from Mark Brunton, Kaitakawaenga Rangahau Māori (Facilitator Research Māori) (Appendix F; page 197). The study researcher sought advice from Mr Brunton regarding ways to attract interest from those
identifying as Māori and Pasifika during the advertisement and recruitment phases. Additionally, Mr Brunton referred the study researcher to local group leaders with established networks within the Māori community. The study researcher contacted all named persons to introduce herself personally and to outline the relevance and potential benefits of the study to Māori and Pacific communities. The study researcher invited them to discuss the study with potential participants, and to disseminate study information, as they deemed appropriate.

4.3 Ethical approval

Ethical approval was obtained from the Southern Health and Disability Ethics Committee, New Zealand (Appendix L; page 211). In anticipation of a quantitative intervention study being carried out subsequent to the present pre-test study (following further development of preliminary Moderation Guidelines), ethical approval was obtained for both studies (Appendix L; page 211). The present study: ‘The NEEDNT Foods Moderation Guidelines: Pre-testing of Preliminary Moderation Guidelines for the NEEDNT Food List’ was undertaken as an initial evaluation phase, for the purposes of providing comprehensive recommendations for enhancing the Moderation Guidelines, prior to progressing to a quantitative intervention study. A proposed project outline for a future intervention study is provided in Appendix B (page 183).

4.4 Study funding

Participation was entirely voluntary and unpaid, however, each participant was offered the opportunity to have a nutrition education consultation with a student dietitian (the study researcher), which took place after the designated trial period and data collection phases. The Department of Human Nutrition (University of Otago) funded professional audio-transcription services.
4.5 Eligibility criteria

Information concerning eligibility was obtained from potential participants using a self-screening form (Appendix H; page 201) disseminated through email or in-person. The self-screening form outlined inclusion criteria, as follows:

- Adult men or women 18-65 years of age;
- Fluent in oral, written and numerical English language;
- Willing and able to give informed consent for assessment and treatment;
- Currently have a BMI of 30 or above (classified as ‘obese’);
- Wanting to lose weight;
- Have not lost ≥5% of total body weight within the last six months;
- Currently registered with a general medical practitioner (GP);
- Not taking insulin, steroids, atypical antipsychotic medications, or weight loss medications;
- Do not have a past or current history of Anorexia, Bulimia Nervosa or EDNOS (Eating Disorder Not Otherwise Specified), Binge Eating Disorder, or Disordered Eating;
- Not currently pregnant, breastfeeding, or planning on becoming pregnant within the next four weeks.

Participants who returned completed self-screening forms, and met the above selection criteria, progressed to the next stage of recruitment.

4.6 Sampling techniques

This study employed non-probability sampling methods, as statistical representativeness is not the aim of qualitative research (Achterberg, 1988; Brikci & Green, 2007). Sample sizes are typically small in qualitative work and one way of identifying how many people are needed is to keep interviewing until ‘saturation’, that is, the point at which nothing new comes from
analysis of data (Achterberg, 1988; Brikci & Green, 2007). However, a more practical method for short-term studies is to estimate this point for any homogeneous group. Homogeneity in this study was based on BMI and repeated previous attempts of weight loss. Hence, a convenience sample size of 10-15 participants was decided upon. Convenience sampling is a method where those selected are based on ease or proximity, in order to minimise costs and ensure time efficiency (Achterberg, 1988; Brikci & Green, 2007). An advertisement was disseminated by bulk email throughout the University of Otago (Dunedin Campus) and Dunedin Public Hospital, and print versions of the advertisement were displayed around the University of Otago (Dunedin Campus). In addition, purposive sampling, where participants are selected because they are likely to generate useful data for the project (Achterberg, 1988; Brikci & Green, 2007) was utilised to recruit Māori and Pacific participants, using email and telephone correspondence with staff from the University of Otago Pacific Island Centre, Te Tumu School of Māori, Pacific and Indigenous Studies, Office of Māori Development, and the public health organisation Arai Te Uru Whare Hauora. Snowball sampling was subsequently used to gain additional Māori and Pacific Island participants. Snowball sampling is often used to facilitate the identification of hard-to-find cases (Achterberg, 1988; Brikci & Green, 2007). In snowball sampling, one or two ‘key individuals’ are identified (in this case, participants who identified as Māori or Pasifika) and are then asked to name or refer other likely participants of the same ‘key identifier’ (Achterberg, 1988; Brikci & Green, 2007).

4.7 Informed consent

All necessary steps were taken to minimise any harm to, and to protect the privacy of, potential study participants. Only the study researcher knew the full names and personal details of study participants, including those who made initial enquiries or registered their interest in the study. Potential study participants were provided with a study information sheet (Appendix D; page 192), which provided detailed information about the study, reassurance of their personal anonymity and confidentiality of all data collected in relation to them, and their right to
withdraw from the study at any stage without explanation or disadvantage (Appendix C: page 189). The details of these procedures are outlined in subsequent sections (4.10, 4.11 & 4.12).

4.8 Resource development

4.8.1 Development of NEEDNT food and beverage categories and subcategories

Fifty NEEDNT foods and beverages, as published in the NEEDNT Food List™, were used verbatim within the Moderation Guidelines. The 50 individual NEEDNT foods and beverages were arranged into categories and subcategories, which were determined by studying typical food and beverage categories presented within a range of publicly available nutrition publications, nutrition analysis software, and commercial weight loss website sources. Specifically, the sources were: Two MOH booklets, entitled ‘Diabetes and Healthy Food Choices’ (Pask, 2014) and ‘Eating for Healthy Adults’ (MOH, 2013); two nutrition software programmes, Diet Cruncher™ (v 1.2.0, 2010 FOODfiles) and Kai-culator™ (v 0.83, Department of Human Nutrition, University of Otago, 2011); and one commercial weight loss website, Weight Watchers™. After examining these sources, the study researcher and supervising dietitian decided upon 126 NEEDNT food and beverage subcategories. NEEDNT Foods Moderation Guidelines are displayed in a reduced-size format within Chapter 5 (Findings).

4.8.2 Quantitative development of non-essential food (NEF) system

Each NEEDNT food and beverage was then assigned a quantified value, corresponding to the mean energy value per specified portion, as follows: each of the 126 food or beverage subcategories was searched individually within the nutritional software programme Kai-culator™. Each search resulted in a list of specific, branded foods, pertaining to the individual NEEDNT foods and beverages. To obtain a representative sample of foods in each subcategory, items from each list were reordered into descending kilojoules per standard serve. Five items were chosen from the search results, corresponding to the lowest energy item, the highest
energy item, the median (midpoint) energy item, and the lower and upper quintile energy items (i.e. the midpoint between the lowest and the mean energy items, and the midpoint between the mean and the highest energy items). The energy values for the five selected food items were then averaged, and the resulting figure was converted into ‘points’ or ‘exchanges’. These exchanges were termed non-essential food values or NEF values. In the NEF system, 100 calories (418 kilojoules) was the equivalent of 1 NEF. Energy averages were rounded to the nearest 0.5 NEF, such that 143 calories was rounded up to 1.5 NEFs and 124 calories was rounded down to 1 NEF and so on. A standardised example of the NEF calculation procedure for the Moderations Guidelines is included in Appendix N (page 224).

4.8.2.1 Rationale for NEF allowances

The study researcher (student dietitian) and clinical supervisor (registered dietitian) consulted the New Zealand, Australian, and USA dietary guidelines in order to research and decide upon acceptable energy intakes, or NEFs, from NEEDNT foods and beverages. After deliberation, the allocated NEFs were: up to 5 NEFs in any one day; up to 19 NEFs total per week; and if possible, 1-2 days per week of zero NEFs. Nineteen NEFs equates to approximately 7950 kJ or 1900 kcal in total per week. This equates to ≤15% of the estimated energy requirements for adult New Zealanders, based upon an average daily intake of 8700 kJ or ~2000 kcal (FSANZ, n.d.). This proportion (≤15%) was an educated appraisal based upon quantified ‘discretionary’ and ‘empty calorie’ allowances, as specified within the ChooseMyPlate™ model (USDA, 2010) and the Australian Dietary Guidelines ‘allowances for additional serves from any food group’ (Nutrition Australia, 2013; NHMRC, 2013b).

4.8.3 Moderation Guidelines print booklet

NEF values for NEEDNT foods and beverages were presented in a basic A5-sized print booklet format, entitled ‘The NEEDNT Foods Moderation Guidelines’. The booklet included a brief introductory rationale for the NEEDNT concept as outlined in the NEEDNT Food List™ and
instructions for using the NEF system. The design and layout features of the print booklet were rudimentary yet adequate for pre-testing, and the content comprised terminology and language deemed suitable for the general public. The Moderation Guidelines were peer-reviewed by a selection of postgraduate dietetics students to check for spelling and grammatical accuracy and overall adequacy of presentation prior to pre-testing.

4.8.4 Behaviour change theories and best practices in nutrition education

The creation of the NEF system and the Moderation Guidelines print booklet was carried out without consultation or input from potential users. Relatedly, the study researcher did not incorporate theories of behaviour change or best practices for nutrition education. The study researcher and supervising dietitian determined this approach would maximise critical appraisal from participants, thereby allowing for participant-informed development of preliminary Moderation Guidelines.

4.9 Development of interview questionnaire

The study researcher developed an interview guide comprising eight core open-ended questions (Appendix O; page 225). Interview questions reflected objectives 2 and 3 outlined within Chapter 3 (Objective statement). The eight core questions aimed to examine:

- Participants’ previous dietary weight loss attempts;
- Interpretations of the concept of dietary moderation;
- Experiences of following/using the Moderation Guidelines for four weeks;
- Comparison of the Moderation Guidelines against previous dietary approaches for weight loss;
- The influence of the Moderation Guidelines on their understanding of dietary moderation;
- Future intentions regarding use of the Moderation Guidelines for long-term weight management;
• Improvements or changes to make the Moderation Guidelines more usable or appealing;
• Any other views, concerns, or thoughts about the Moderation Guidelines and managing their weight in general.

Each core question was followed by further questions or prompts to ascertain more in-depth information from participants. Participants were encouraged to discuss and elaborate as they wished, within the context of the question asked, to ensure feedback was personally relevant and representative of their own perceptions and experiences.

4.9.1 Rationale for semi-structured interviews

One-on-one, semi-structured interviews were chosen as the method for data collection over focus groups or other qualitative methods. Individual semi-structured interviews were deemed to be the most appropriate form of gathering data that would reflect the personal experiences of using the Moderation Guidelines, while allowing participants to freely share information of a personal or sensitive nature (Patton, 2002).

4.9.2 Pilot interviews

The student researcher’s two supervisors provided input into question development and interviewing technique. The study researcher conducted pilot one-on-one interviews with two fellow postgraduate (MDiet) students. The students, acting as potential participants, provided feedback to the study researcher regarding interview techniques and the wording of questions, and modifications were made accordingly.

4.9.3 Rationale for 4-week pre-test period

Participants were required to follow the Moderation Guidelines for a 4-week period, in a free-living (non-laboratory) capacity. Based upon the clinical experience and judgement of the study researcher and supervising dietitian, four weeks was deemed an adequate time period for
participants to become sufficiently familiar with NEEDNT food and beverage categories and NEF values, and sufficiently practised in applying the Moderation Guidelines.

4.10 Study protocol

Following self-screening, the study researcher met with each participant individually to discuss the requirements of the study. Participants were informed the study involved a 4-week period where they were required to utilise and follow the Moderation Guidelines, and then participate in a one-on-one feedback interview with the study researcher. During the pre-study meeting, each participant was provided with the Moderation Guidelines print booklet and a set of New Zealand standardised cups and spoons. The study researcher provided minimal verbal instructions for using the Moderation Guidelines, so that subsequent interview feedback might reveal instructional gaps within the Moderation Guidelines preamble. Instead, participants were asked to read through the Moderation Guidelines at their leisure, paying particular attention to introductory instructions. Participants were encouraged to spend a few days familiarising themselves with NEEDNT foods and beverages, serving sizes, and corresponding NEF values, and to consider how they would implement them, prior to the 4-week pre-test period. Participants were instructed to record their NEEDNT food and beverage consumption, portion sizes, and corresponding NEF values, in the allocated pages at the end of the Moderation Guidelines print booklet. Participants were also encouraged to adhere as best they could to the recommended NEF quotas (up to 5 NEFs in any one day; up to 19 NEFs total per week; and 1-2 days per week of zero NEFs; see section 5.2 ‘NEEDNT Foods Moderation Guidelines’). However, participants were reassured that their NEEDNT food and beverage intake and NEF values would not be reviewed or assessed by the study researcher, and their written record was for themselves only.

At the conclusion of individual meetings, the study researcher and participant agreed upon a start date for their 4-week trial period (no sooner than 2 days and no later than 7 days from the
day of the meeting). The study researcher contacted each participant by phone or email just prior to his or her pre-test period, to answer any questions that may have arisen from reading through the Moderation Guidelines print booklet. Participants were next contacted at the conclusion of their 4-week trial period to arrange a time and place for their in-depth, one-on-one feedback interview.

4.11 Semi-structured interviews

One-on-one semi-structured interviews were conducted between November 2012 and April 2013. Interviews took place in a private location and at a time chosen by the interviewees. Prior to commencing each interview, the interview agenda was explained to the participant. Participants were reminded that their participation was entirely voluntary and that they may elect to terminate the interview at any stage, or decline to respond to a question, as stated in the study information sheet (Appendix D; page 192).

Interviews were conducted in an informal, conversational style, and lasted between 30 and 90 minutes, depending on the extent of feedback. All participants consented to the use of a digital recorder during interviews. This method allowed the researcher to pay full attention to the interviewees. Participants were given the option of requesting the tape recorder be switched off at any point during the interview. No names, or first names only, were used during interview recording, according to the participant’s wishes. Audio recordings were stored securely at all times.

4.12 Data transcription

Digital recordings of participants’ interviews were transcribed into word documents by a third party. The third party was limited to identifying participants by first name only, and verbally agreed to strict confidentiality of content and permanent deletion of all files once transferred to the study researcher. The completed transcripts were crosschecked for accuracy and arranged into standardised format by the study researcher in preparation for thematic analysis.
4.13 NVivo qualitative data analysis

Data were analysed using NVivo10 Qualitative Data Analysis Software (QSR International Pty Ltd, 2014). Transcripts were uploaded into NVivo and coded through a combination of manual ‘broad-brush’ and ‘detailed coding’ as well as supplementary ‘In Vivo’ coding. The combination of both manual and automated coding methods allowed for exhaustive coding of interview data (Richards, 2015). Data were ‘auto coded’ by question number, so that participants’ answers to individual questions could be directly compared (Richards, 2015). Following coding, a variety of coding queries were conducted; text search queries, word frequency queries, coding queries, matrix queries, and coding comparison queries, in order to analyse patterns and emerging themes (Richards, 2015). Emerging themes were identified in relation to the focus of enquiry (Thomas, 2006). Coding of transcribed data was done in two phases; a scanning phase followed by a closer examination of the raw data (in-depth, line-by-line). Since interviewees’ answers to the eight core questions were often discussed in multiple places, questions were analysed both individually, and as a grouped unit. To ensure coding categories were comprehensive, data analysis ended only when theoretical saturation was attained (Patton, 2002; Thomas, 2006). Theoretical (or data) saturation is the point at which analyses reaches a closure; no new categories or incidents emerge (Edmunds, & Brown, 2012; Patton, 2002). In this study, the achievement of data saturation was confirmed when there was redundancy in critical incidents and no new perspectives, experiences, or recommendations emerged from the data (Edmunds, & Brown, 2012; Patton, 2002). The overall data analysis process utilising NVivo is illustrated in Figure 1 (page 68).

4.14 General inductive approach

This study employed a general inductive approach for analysing qualitative data. This approach provides a usable and systematic set of procedures for analysing qualitative data, producing reliable and valid findings (Thomas, 2006). Unlike other more complex analytic approaches, the general inductive approach is generic in nature, and is not associated with a specific
philosophy or methodology of qualitative research (e.g. grounded theory, phenomenology, discourse analysis, narrative analysis). As such, the general inductive approach is not as strong as some other analytic strategies, however, for the purposes of this pre-test study, the approach provided a simple, non-technical methodology for deriving meaningful feedback (Thomas, 2006). The general inductive approach was used to systematically analyse interview data and develop explanatory thematic frameworks (Thomas, 2006). In this approach, each critical incident was initially studied in-depth, line-by-line. Key phrases were underlined, and later, comparisons were made to identify key patterns in the data. Data were then organised into major themes and sub-themes, and summarised in writing through brief descriptions and illustrative quotes corresponding to each theme and subtheme. Data analysis in qualitative literature is a non-mathematical procedure that involves systematically examining and understanding participants’ experiences (Edmunds, & Brown, 2012; Patton, 2002). Exploration, description and in-depth understanding were the objectives of this study. Hence, quantitative research, which focuses on statistical representativeness, quantification, and generalisations, would not have achieved the objectives within this exploratory research (Burnard, Gill, Stewart, Treasure, & Chadwick, 2008; Harris et al., 2009). The prime focus of this study was to explore and understand the personal experiences and perspectives of participants. The overall data analysis process, based on a general inductive approach, is illustrated in Figure 1 (page 68).

### 4.14.1 Triangulation

In this study, data were triangulated through attention to: 1. The perspectives of one overall group of obese people and four sub-groups; Males, Females, New Zealand European, New Zealand Māori/Pacific Island (triangulation of sources); 2. Interview data alongside relevant scientific literature on nutrition education resources (data triangulation); and 3. The student researcher and both research supervisor’s interpretations of the data (analyst triangulation).
Preliminary phase:
Data cleaning and formatting of interview transcripts using 'Word Styles'. Transcripts imported into NVivo software as raw data sources.

Pre-reading and critical reflection:
Raw data read in detail until study researcher was familiar with the content and gained an understanding of emerging themes and topics covered throughout text.

Upper level coding in NVivo:
The study researcher identified and defined broad emerging categories. These general categories were derived from research objectives 2 and 3, and from the 8 core interview questions.

Lower level coding in NVivo:
The study researcher identified and defined more specific subcategories, derived from multiple readings of the raw data, line-by-line, applying both manual coding and 'in vivo' coding to draw codes as much as possible from participants' own words.

Code cleaning:
Merging of similar or overlapping lower level codes, and uncoding of text not relevant to evaluation objectives.

Saturation:
Continued revision and refinement of categories and subcategories, identifying contradictory points of view and/or new insights. Analyses ended when no further lower level category revisions emerged.

Search queries in NVivo:
Study researcher conducted multiple search queries, including autocoding searches, text searches, and word frequency searches.

Written report of findings:
Study researcher reported findings by broad theme, using quotes to illustrate the essence of categories and subcategories, and nuances within each subcategory.

Figure 1. The data analysis process based on a general inductive approach
4.14.2 Researcher reflexivity

Researcher reflexivity is a process of critically reflecting and recognising the potential effect the researcher may have on the research process itself (Côté & Turgeon, 2005; Malterud, 2001). Qualitative researchers usually work closely with the subject matter being studied, because the investigator themselves is normally the research instrument (Edmunds, & Brown, 2012; Patton, 2002). As a student dietitian and researcher, my experiences, background, perspectives, values, and prejudices, may have had an influence upon the outcomes of the study. To counter this, I as the study researcher endeavoured to remain objective, by maintaining a level of disconnection and consistency throughout all stages of data collection and analyses.

The next chapter (Findings) describes the research results, paying particular attention to participants’ perceptions and experiences of the Moderation Guidelines.
5 Findings

This chapter is divided into six major sections. The first section (5.1) describes the demographic characteristics of the participants, including age, gender, and ethnicity. Section 5.2 pertains to Objective 1 of the empirical research, presenting the Moderation Guidelines in preliminary format to study participants. The subsequent sections (5.3, 5.4, 5.5, and 5.6) pertain to Objectives 2 and 3 of the empirical research, discussing the broad themes that emerged from in-depth participant interviews. The broad themes, and subthemes thereof, are described systematically by way of an introductory description, participant quotes, the author’s paraphrasing, and a summary of key findings. The use of selected, verbatim quotes emphasises participants’ voices in relation to past experiences of weight management and interpretations of dietary moderation, and present experiences of using the Moderation Guidelines. Instances of the author’s (study researcher’s) paraphrasing are denoted by single quotation marks within the main body of text, while participant quotes are indented from the left margin and denoted by a participant identification number. In order to represent the complexity and nuances within the research data, contrasting perspectives are included, and alternative (minority) views acknowledged, where indicated by participants. Data from several broad themes and subthemes are at times described concurrently, as participants’ perspectives often embodied two or more intertwined themes. Finally, a summary table, presenting participants’ recommendations for enhancing the NEEDNT concept and preliminary NEEDNT Foods Moderation Guidelines, is included at the end of this chapter (Table 3; page 115).

5.1 Participant characteristics

All twelve participant invitees accepted and fully completed the pre-testing period and subsequent interviews. The twelve participants trialled the Moderation Guidelines for a 4-week period between November 2012 and March 2013, and were subsequently interviewed, individually, between December 2012 and April 2013. Participants were ten University of
Otago Staff members and two current University of Otago students. The demographic characteristics of participants are summarised below in Table 2.

Table 2. Overview of participants’ demographic characteristics

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Participant Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex/Gender</td>
<td>6 Male</td>
</tr>
<tr>
<td></td>
<td>6 Female</td>
</tr>
<tr>
<td>Age</td>
<td>Range: 22-57 years</td>
</tr>
<tr>
<td></td>
<td>Median: 47 years</td>
</tr>
<tr>
<td></td>
<td>Average: 44 years</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>7 New Zealand European</td>
</tr>
<tr>
<td></td>
<td>2 New Zealand Māori</td>
</tr>
<tr>
<td></td>
<td>1 Pacific; specifying “Full Tongan”</td>
</tr>
<tr>
<td></td>
<td>2 participants identified as ‘Other’; specifying “English, Irish, Burmese &amp; Portuguese”, and “British”</td>
</tr>
<tr>
<td>Iwi (Tribe)</td>
<td>1 New Zealand Māori participant identified their Iwi as ‘Waitaha’, ‘Kati Mamoe’, and ‘Kai Tahu’</td>
</tr>
<tr>
<td></td>
<td>1 New Zealand Māori participant identified their Iwi as ‘Ngāti Porou’</td>
</tr>
<tr>
<td>Ethnicity against Sex/Gender</td>
<td>Of the seven New Zealand European participants, three were Male and four were Female</td>
</tr>
<tr>
<td></td>
<td>Of the two New Zealand Māori participants, one was Male and one was Female</td>
</tr>
<tr>
<td></td>
<td>The Tongan participant was Female</td>
</tr>
<tr>
<td></td>
<td>Of the two participants identifying as ‘Other’ ethnicities, one was Male and one was Female</td>
</tr>
</tbody>
</table>
5.2 NEEDNT Foods Moderation Guidelines

Preliminary NEEDNT Foods Moderation Guidelines are displayed in Figure 2 (page 73). The A5 print booklet includes the following sections:

- **Covering page** – including details of the developers (student researcher and supervising researchers).
- **Instructional blurb** (pages 1-2) – outlining the NEEDNT philosophy, and introducing the NEF value system and recommended daily/weekly quotas.
- **Main body** (pages 3-12) – comprising all NEEDNT food and beverage categories (in lilac) and subcategories (in grey). Content is listed alphabetically by main category (in lilac) with a range of food examples (bullet pointed), serving sizes, and corresponding NEF values, as per the methodology described in Chapter 4 (Methods).
- **Recording section** (pages 13-16) – comprising 4 blank pages for participants to record NEF intakes.
- **Notes section** (pages 17-20) – comprising 4 pages for participants to make miscellaneous notes, e.g. pertaining to their experiences of using the Moderation Guidelines.
- **The original NEEDNT Food List™** (pages 21-22) – included to provide participants with an overview of the NEEDNT concept.
- **Back cover** – including contact information for the lead researcher, Dr Jane Elmslie.
The NEEDNT Foods Moderation Guidelines

A resource for moderating Non-Essential, Energy-Dense, Nutritionally deficient foods

Developed by
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“Eat in moderation. Drink in moderation. Be merry all you want.”

Figure 2. The preliminary NEEDNT Foods Moderation Guidelines in A5 print booklet format
What are these guidelines about?

These guidelines have been developed to help those with a BMI of 30 or above, to move towards a more comfortable weight, by moderating particular foods that tend to undermine weight-management. These foods are typically high in calories from saturated fats and/or simple sugars, while being relatively low in the key nutrients we need for our health and wellbeing. These foods have been named NEEDNT foods, or non-essential, energy-dense, nutritionally deficient foods.

Are these guidelines all I need?

The moderation guidelines are a first step towards becoming more aware of your eating habits. As you progress with your weight-management, you may like to use these guidelines alongside broader nutrition information and positive lifestyle practices. If this appeals to you, please contact your GP for a referral to a see a Registered Dietitian.

Terms to be familiar with:

All NEEDNT foods have been given a value called a NEF serving, or Non-Essential Food serving. Why? Well, NEF is a tad shorter than NEEDNT, plus it has quite a nice ring to it!

So from here on, think in NEFs!

Okay, the million-dollar question...

How many NEFs may I eat?

To gain the greatest benefits from these guidelines, we advise you allocate yourself:

- Up to 5 NEFs in any one day
- Up to 19 NEFs total per week
- 1-2 days NEF-free per week

[19 NEFs is around 13% of the average estimated energy needs of NZ adults]

How do I figure out a NEF serving?

You might come across a food that matches the description of a NEF yet is not listed in this booklet. That’s okay! Just compare it to a similar NEF then guess the NEF servings using your ‘eye-metre’.

For quantities in cups or spoons:

We encourage you to use standard NZ metric cup & spoon sets alongside this resource. These can be purchased from supermarkets and home-ware stores.

So how do I get started?

Before you get started have a good read through the booklet to familiarise yourself with NEFs and servings. When you are ready to start, you can record your NEFs in the back of this booklet to keep track.

So, turn the page and let’s get underway!
## Baking & Desserts:

### Biscuits
- **Cookie**
  - 1 giant cookie
  - 1 large biscuit
  - Quantity: 4.5
- **Café-style biscuit**
  - 1 large biscuit
  - Quantity: 1
- **Chocolate-coated biscuits**
  - 2 biscuits
  - 2 biscuits and/or jam filling
  - Quantity: 1.5
- **Plain, fruit or chocolate-chip biscuits**
  - 2 biscuits
  - Quantity: 1

### Cakes & Slices
- **Rich gateaux / layered cake**
  - 1 slice [⅓ 20-23cm diam cake]
  - 1 slice [¼ frozen supermarket cheesecake]
  - Quantity: 4.5
- **Cheesecake**
  - 1 slice [approx. 5x4x3cm]
  - Quantity: 3.5
- **Slice or brownie**
  - 1 slice [⅓ 20-23cm diam cake]
  - Quantity: 2.5
- **Cake**
  - 1 slice [⅓ 16cm diam round cake or loaf cake 14x8cm]
  - Quantity: 2

### Desserts & Puddings
- **Fruit crumble**
  - 1 serve [¼ cup]
  - 1 serve [⅓ 20cm diam pie/tart or 1 individually packaged]
  - Quantity: 4
- **Pie or tart**
  - 1 serve [⅗ pudding recipe or 1 individually packaged]
  - Quantity: 3
- **Self-saucing or syrup pudding**
  - 1 serve [⅔ pudding recipe or 1 individually packaged]
  - Quantity: 3
- **Creamed rice or bread & butter pudding**
  - 1 serve [100g can rice or ⅔ b&b pudding recipe]
  - Quantity: 2
- **Ambrosia or trifle**
  - 1 serve [⅓ cup]
  - 1 serve [⅔ 23cm diam cake]
  - Quantity: 1
- **Pavlova**
  - 1 serve [⅓ cup]
  - 1 serve [⅔ 23cm diam cake]
  - Quantity: 1
- **Custard or mousse**
  - 1 serve [⅓ cup]
  - Quantity: 1
- **Jelly**
  - 1 serve [⅓ 20cm diam pie]
  - 1 small scoop
  - Quantity: 1
- **Sorbet**
  - 1 serve [⅓ 20cm diam pie]
  - 1 small scoop
  - Quantity: 1

## Desserts & Puddings (continued)

### Doughnuts & Sweet Breads
- **Doughnut filled with cream or jam**
  - 1 individual long or round bun
  - 1 standard sized ring
  - Quantity: 5.5
- **Doughnut ring**
  - 1 standard sized ring
  - Quantity: 3
- **Chelsea bun, brioche, iced sweet bun or cream bun**
  - 1 individual bun
  - Quantity: 3

### Muffins & Scones
- **Café-style muffin or scone - savoury or sweet**
  - 1 jumbo sized
  - Quantity: 5
- **Muffin or scone - savoury or sweet**
  - 1 standard sized
  - Quantity: 2.5

### Pastry
- **Croissant or Danish**
  - 1 standard individual [15cm croissant or 120g Danish]
  - Quantity: 5
- **Premade or homemade pastry**
  - 1 serve [⅔ slice of double crust pie made with 2x23cm diam sheets]
  - Quantity: 1.5

### Pies, Savouries & Pasties
- **Meat or vegetable pie**
  - 1 serve [1 individual pie approx. 170-200g]
  - 1 serve [⅔ family sized pie or approx. 125g]
  - Quantity: 4
- **Family sized dinner pie**
  - 1 serve [1 individual pie approx. 15cm long]
  - 1 serve [⅔ family sized pie or approx. 180g]
  - Quantity: 4
- **Sausage roll**
  - 1 serve [1 individual approx. 2-3 small pieces]
  - Quantity: 3
- **Party-sized savouries**
  - 1 serve [1 individual approx. 120g or 1 slice approx. ⅔ recipe]
  - Quantity: 3

### Quiche
- **Pastry-based quiche or bacon & egg pie**
  - 1 individual [approx. 120g]
  - Quantity: 3

---

Page 3
### BEVERAGES:

**Alcoholic Drinks:**
It is vital you bear in mind that Alcohol is harmful in excess. Please follow the ALAC guidelines for reduced-risk drinking. In a nutshell they are:
- **No more than 10 drinks per week for adult non-pregnant women &
- No more than 15 drinks per week for adult men.**

For more information please see the full ALAC guidelines document (Drink Check) available at alac.org.nz

<table>
<thead>
<tr>
<th>NEF by Group</th>
<th>Quantity [approx. weight]</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>How to work out NEFs for alcohol:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>You can use the examples given below or refer directly to the number of standard drinks as specified on the packaging:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>For example:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3 standard drinks = 1.3 NEF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Beer 4% alcohol**
- **Medium wine**
- **Pure spirits**
- **Cream liqueur**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 can [330ml]</td>
<td>1</td>
</tr>
<tr>
<td>1 standard glass [100ml]</td>
<td>1</td>
</tr>
<tr>
<td>1 shot [30ml]</td>
<td>1</td>
</tr>
<tr>
<td>1 shot [30ml]</td>
<td>1</td>
</tr>
</tbody>
</table>

**Cordial & Fruit Drinks**
- **Cordial or fruit syrup (prepared with water as directed or premade)**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 glass [250ml]</td>
<td>1</td>
</tr>
</tbody>
</table>

**Drinking Chocolate & Beverage Powders**
- **Hot chocolate powder, Milo™ or similar beverages**
- **Flavoured coffee powders**
- **Flavoured milk mix / powder**

<table>
<thead>
<tr>
<th>NEF by Group</th>
<th>Quantity [approx. weight]</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy &amp; Sports Drinks</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy drink</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports drink (premade or prepared from powder as directed)</td>
<td>Large bottle [500ml]</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>2 cups or ½ 750ml bottle</td>
<td></td>
</tr>
</tbody>
</table>

### NUTRITION FACTS

<table>
<thead>
<tr>
<th>NEF by Group</th>
<th>Quantity [approx. weight]</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy &amp; Sports Drinks (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy drink</td>
<td>1 small can [250ml]</td>
<td>1</td>
</tr>
<tr>
<td>Sports drink (premade or prepared from powder as directed)</td>
<td>1 glass [250ml] or ½ 750ml bottle</td>
<td>1</td>
</tr>
</tbody>
</table>

**Fruit Juices**
- **Pure fruit juice & fruit-based smoothies [except tomato juice & unsweetened blackcurrant juice]**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 glass [250ml]</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Regular Powdered Drinks**
- **Regular sachet powder drink made as directed**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 glass [250ml]</td>
<td>1</td>
</tr>
</tbody>
</table>

**Regular Soft Drinks**
- **Regular soft drink, sweetened carbonated beverage or mixer**
- **Regular soft drink, sweetened carbonated beverage or mixer**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 litre</td>
<td>6.5</td>
</tr>
<tr>
<td>1 can [355ml]</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**BREAKFAST CEREALS:**

**Toasted Muesli or other Cereal with ≥15g sugar / 100g**
- **Toasted muesli**
- **Sweetened cereals or novelty cereals**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 serve [55g or ½ cup]</td>
<td>2</td>
</tr>
<tr>
<td>1 serve [¾ cup]</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**CONFECTIONARY:**

**Chocolate**
- **Chocolate block varieties**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 family / king-sized block [170-250g]</td>
<td>11</td>
</tr>
<tr>
<td>NEF by Group</td>
<td>Quantity [approx. weight]</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>Chocolate (continued)</strong></td>
<td></td>
</tr>
<tr>
<td>• Chocolate bar varieties</td>
<td>1 individual bar [50-60g]</td>
</tr>
<tr>
<td>• Block chocolate</td>
<td>1 standard serve [25g] or approx. 1 row</td>
</tr>
<tr>
<td>• Boxed or individual</td>
<td>2 individual pieces</td>
</tr>
<tr>
<td>chocolates</td>
<td>20g bar</td>
</tr>
<tr>
<td>• Bite-sized bar</td>
<td></td>
</tr>
<tr>
<td><strong>Lollies &amp; Sweets</strong></td>
<td></td>
</tr>
<tr>
<td>• Sweets or lollies</td>
<td>1 family bag [140-200g]</td>
</tr>
<tr>
<td>• Sweets or lollies:</td>
<td></td>
</tr>
<tr>
<td>▪ Jellies, boiled sweets or</td>
<td>1 standard serve [25g]:</td>
</tr>
<tr>
<td>mints</td>
<td>E.g. 4-5 jellies</td>
</tr>
<tr>
<td>▪ Chews, toffees or liquorice</td>
<td>E.g. 3 chews</td>
</tr>
<tr>
<td>▪ Fudge, nougat, coconut</td>
<td>E.g. 1 small square fudge</td>
</tr>
<tr>
<td>ice or bite-sized chocolate</td>
<td></td>
</tr>
<tr>
<td>fish</td>
<td></td>
</tr>
<tr>
<td><strong>DAIRY PRODUCTS:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Condensed Milk</strong></td>
<td></td>
</tr>
<tr>
<td>• Condensed milk (regular,</td>
<td>1 can [395g]</td>
</tr>
<tr>
<td>lite &amp; flavoured varieties)</td>
<td></td>
</tr>
<tr>
<td>• Condensed milk (regular,</td>
<td>¼ cup [63ml]</td>
</tr>
<tr>
<td>lite &amp; flavoured varieties)</td>
<td></td>
</tr>
<tr>
<td>• Condensed milk homemade</td>
<td>3 Tbsp</td>
</tr>
<tr>
<td>dressing (approx. 50:50 ratio</td>
<td></td>
</tr>
<tr>
<td>with vinegar)</td>
<td></td>
</tr>
<tr>
<td><strong>Flavoured Milk &amp; Milkmakes</strong></td>
<td></td>
</tr>
<tr>
<td>• Flavoured milk varieties</td>
<td>1 litre carton</td>
</tr>
<tr>
<td>• Milkshake, thickshake or</td>
<td>1 medium sized [approx. 400ml]</td>
</tr>
<tr>
<td>Café-style blended frappe</td>
<td></td>
</tr>
<tr>
<td>with cream</td>
<td></td>
</tr>
<tr>
<td>• Flavoured milk &amp; breakfast</td>
<td>1 small carton/cup [250ml]</td>
</tr>
<tr>
<td>cereal beverages</td>
<td></td>
</tr>
<tr>
<td><strong>NEF by Group</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Quantity [approx. weight]</strong></td>
<td></td>
</tr>
<tr>
<td><strong>NEF Serving</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Icecream</strong></td>
<td></td>
</tr>
<tr>
<td>• Decadent chocolate-</td>
<td>1 individually packaged</td>
</tr>
<tr>
<td>covered icecream on a stick</td>
<td>1 standard sundae</td>
</tr>
<tr>
<td>• Soft serve sundae with</td>
<td></td>
</tr>
<tr>
<td>sweet topping</td>
<td></td>
</tr>
<tr>
<td>• Icecream (regular or lite)</td>
<td>1 small scoop [85g]</td>
</tr>
<tr>
<td>• Icecream on a stick or cone</td>
<td>1 individually packaged</td>
</tr>
<tr>
<td>• Soft serve cone with extras</td>
<td>1 standard sized</td>
</tr>
<tr>
<td><strong>Sour Cream</strong></td>
<td></td>
</tr>
<tr>
<td>• Sour cream or crème</td>
<td>¼ cup</td>
</tr>
<tr>
<td>fraiche (regular)</td>
<td>½ cup</td>
</tr>
<tr>
<td>• Sour cream or crème</td>
<td></td>
</tr>
<tr>
<td>fraiche (reduced-fat)</td>
<td></td>
</tr>
<tr>
<td><strong>Whole Milk</strong></td>
<td></td>
</tr>
<tr>
<td>• Dark blue or silver top</td>
<td>1 litre</td>
</tr>
<tr>
<td>milk</td>
<td>1 cup [250ml]</td>
</tr>
<tr>
<td><strong>Yoghurt Products with ≤10 sugar per 100g</strong></td>
<td></td>
</tr>
<tr>
<td>• Gourmet, Greek, fromage</td>
<td>150g pottle</td>
</tr>
<tr>
<td>fraises &amp; dessert-style</td>
<td></td>
</tr>
<tr>
<td>yoghurts</td>
<td></td>
</tr>
<tr>
<td>• Yoghurt, dairy food, frozen</td>
<td>150g pottle</td>
</tr>
<tr>
<td>yoghurt or drinking yoghurt</td>
<td></td>
</tr>
<tr>
<td><strong>FAST FOODS &amp; TAKEAWAYS:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Deep Fried Foods</strong></td>
<td></td>
</tr>
<tr>
<td>• Battered fish fillet</td>
<td>1 fillet [15cm long]</td>
</tr>
<tr>
<td>• Hot dog or sausage</td>
<td>1 individual sausage</td>
</tr>
<tr>
<td>• Coated chicken</td>
<td>1 medium piece</td>
</tr>
<tr>
<td>• Spring roll</td>
<td>1 roll [10-12cm]</td>
</tr>
<tr>
<td>• Sweet &amp; sour pork</td>
<td>1 cup [250ml]</td>
</tr>
<tr>
<td>• Nuggets, hash brown,</td>
<td>5 nuggets or 1 individual</td>
</tr>
<tr>
<td>croquettes and similar items</td>
<td>hash brown</td>
</tr>
</tbody>
</table>
### NEF by Group

<table>
<thead>
<tr>
<th>Quantity [approx. weight]</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Chips &amp; Wedges</td>
<td></td>
</tr>
<tr>
<td>• Hot chips or fries – shoestring, French, crinkle, thick or straight cut 1 cup or 1 regular container or pottle</td>
<td>3</td>
</tr>
<tr>
<td>• Wedges 1 cup or 4-7 medium wedges</td>
<td>1.5</td>
</tr>
<tr>
<td>Takeaways</td>
<td></td>
</tr>
<tr>
<td>• Double meat or large / gourmet burger 1 extra large</td>
<td>6</td>
</tr>
<tr>
<td>• Burger 1 standard/average sized</td>
<td>4.5</td>
</tr>
<tr>
<td>• Creamy or buttery curry, ethnic meal or fried rice 1 cup [250ml]</td>
<td>3.5</td>
</tr>
<tr>
<td>• Pizza 2 slices large</td>
<td>4</td>
</tr>
<tr>
<td>• Sub or sandwich with high-fat meats &amp; sauces (or an equivalent wrap, roll, or donor kebab) 1 six-inch or 1 standard sized</td>
<td>4.5</td>
</tr>
</tbody>
</table>

**Do you remember how to work out a NEF serving?**

There’s a lot of variability in takeaways! So, if you choose a food that isn’t listed above, just match it to a similar listed food, compare the size, then guess the NEF servings using your ‘eye-meter’

### FATS, CREAMS & BUTTERS:

**Butter & Solid Fats**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butter, butter-blends, lard, dripping, shortening or meat fat 100g</td>
<td>8</td>
</tr>
<tr>
<td>Butter, lard, dripping, shortening or meat fat 1 serve [1 tsp]</td>
<td>0.5</td>
</tr>
</tbody>
</table>

**Cream**

- Liquid cream
- Liquid cream (lite)
- Whipped cream
- Whipped cream (lite)
- Cream-based sauces (pasta sauce, curry sauce, simmer sauce etc) 1/2 cup [140g] | 3 |
- Cream-based soups 1 cup [250ml] | 2 |
- Creamy dips or spreads made from cream, whole milk, sour cream, reduced-cream or yoghurt 1/4 cup [60g] | 1.5 |
- Cream-based dressings (mayonnaise, aioli, tartare, béarnaise, hollandaise, caesar, dijonaise etc) 1 Tbsp [15-20g] | 0.5 |

**Reduced Cream**

- Reduced cream 1 can [250ml] | 5.5 |
- Reduced cream 1/4 cup [63ml] | 1.5 |

**Coconut Cream**

- Coconut cream (regular or lite) 1 can [408g] | 9.5 |
- Coconut cream (regular or lite) 1/2 cup [125ml] | 3 |
<table>
<thead>
<tr>
<th>NEF by Group</th>
<th>Quantity [approx. weight]</th>
<th>NEF Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FRUIT PRODUCTS:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Fruit tinned in heavy or lite syrup</td>
<td>¼ can [102g]</td>
<td>1</td>
</tr>
<tr>
<td>• Fruit tinned in heavy or lite syrup – syrup well drained &amp; discarded</td>
<td>¼ can [66g]</td>
<td>0.5</td>
</tr>
<tr>
<td>• Fruit-flavoured rolls, sticks or straps</td>
<td>1 serve [15-20g]</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>PROCESSED MEATS:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Regular sausages, frankfurters or salami</td>
<td>1 standard sausage</td>
<td>2</td>
</tr>
<tr>
<td>• Regular luncheon sausage / chicken roll, pastrami, salami, steak or middle bacon, or similar high-fat processed meats</td>
<td>2 slices or rashers</td>
<td>1.5</td>
</tr>
<tr>
<td>• Pate or canned corned beef</td>
<td>¼ cup</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>SNACK FOODS:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chips / Crisps:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Corn chips, potato crisps or vegetable crisps</td>
<td>1 large / family bag [150g]</td>
<td>7</td>
</tr>
<tr>
<td>• Corn chips, potato crisps or vegetable crisps</td>
<td>1 standard serve [50g]</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>High-Fat Crackers with ≥ 10g fat per 100g</strong></td>
<td>2 standard or 4 small sized</td>
<td>1</td>
</tr>
<tr>
<td><strong>Muesli Bars &amp; Snack Bars</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Meal replacement bars</td>
<td>½ jumbo bar [60-80g]</td>
<td>2.5</td>
</tr>
<tr>
<td>• Chocolate or yoghurt-coated muesli bar or snack bar</td>
<td>1 individual bar [approx. 35g]</td>
<td>1.5</td>
</tr>
<tr>
<td>• Plain or fruit muesli bar, soft cereal or muffin bar</td>
<td>1 individual bar [approx. 30g]</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>NEF by Group</th>
<th>Quantity [approx. weight]</th>
<th>NEF Serving</th>
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</thead>
<tbody>
<tr>
<td><strong>Nuts Roasted in Fat or Oil</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Nuts roasted in butter, oil or honey etc.</td>
<td>¼ cup</td>
<td>3</td>
</tr>
<tr>
<td><strong>Popcorn with Butter or Oil</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Cinema popcorn made with butter or oil</td>
<td>1 small [80g] container</td>
<td>1</td>
</tr>
<tr>
<td>• Caramel or candied popcorn</td>
<td>1 small bag [50g]</td>
<td></td>
</tr>
<tr>
<td><strong>SUGARS, SYRUPS &amp; SPREADS:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Glucose</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pure glucose liquid</td>
<td>1 Tbsp [15ml]</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Sweet Spreads</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Jam, marmalade, honey or lemon curd</td>
<td>1 Tbsp [20g]</td>
<td>0.5</td>
</tr>
<tr>
<td>• Chocolate &amp; hazelnut spreads</td>
<td>1 Tbsp [14g]</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Sugar</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sugar e.g. white, raw, low-GI, brown, Demerara, coffee crystals</td>
<td>1 cup [126g]</td>
<td>7.5</td>
</tr>
<tr>
<td>• Sugar including white, raw, low-GI, brown, Demerara, coffee crystals, etc.</td>
<td>3 tsp [12g]</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Syrups, Sauces &amp; Toppings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Golden syrup, treacle, maple syrup, corn syrup, fruit syrups &amp; flavoured syrups</td>
<td>1 Tbsp [20g]</td>
<td>0.5</td>
</tr>
<tr>
<td>• Icecream toppings &amp; sweet sauces such as chocolate, caramel &amp; fruit compote</td>
<td>2 Tbsp [40g]</td>
<td>0.5</td>
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<tr>
<td>Day/Date</td>
<td>Type of NEF Food Eaten</td>
<td>Quantity</td>
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<tr>
<th>Day/Date</th>
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<th>Number of NEF Servings</th>
<th>Running Total</th>
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<td>Day/Date</td>
<td>Type of NEF Food Eaten</td>
<td>Quantity</td>
<td>Number of NEF Servings</td>
<td>Running Total</td>
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<th>Day/Date</th>
<th>Type of NEF Food Eaten</th>
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<th>Number of NEF Servings</th>
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Page 15

Page 16
Original List as Published:
‘NON-ESSENTIAL, ENERGY-DENSE, NUTRITIONALLY DEFICIENT FOODS’

<table>
<thead>
<tr>
<th>NEEDNT FOOD</th>
<th>REPLACE WITH:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alcoholic drinks</td>
<td>Water/diet soft drinks</td>
</tr>
<tr>
<td>2. Biscuits</td>
<td>*</td>
</tr>
<tr>
<td>3. Butter, lard, dripping or</td>
<td>Lite margarine or similar spread or omit</td>
</tr>
<tr>
<td>similar fat (used as a spread</td>
<td></td>
</tr>
<tr>
<td>or in baking/cooking etc.)</td>
<td></td>
</tr>
<tr>
<td>4. Cakes</td>
<td>*</td>
</tr>
<tr>
<td>5. Chocolate</td>
<td>*</td>
</tr>
<tr>
<td>6. Coconut cream</td>
<td>Lite coconut milk/coconut flavoured lite</td>
</tr>
<tr>
<td></td>
<td>evaporated milk</td>
</tr>
<tr>
<td>7. Condensed milk</td>
<td></td>
</tr>
<tr>
<td>8. Cordial</td>
<td>Sugar free cordial</td>
</tr>
<tr>
<td>9. Corn chips</td>
<td>*</td>
</tr>
<tr>
<td>10. Cream (including crème</td>
<td>Natural yoghurt [or flavoured yoghurt depending</td>
</tr>
<tr>
<td>fraiche)</td>
<td>use]</td>
</tr>
<tr>
<td>11. Crisps (including vegetable</td>
<td>*</td>
</tr>
<tr>
<td>crisps)</td>
<td></td>
</tr>
<tr>
<td>12. Desserts/puddings</td>
<td>*</td>
</tr>
<tr>
<td>13. Doughnuts</td>
<td>*</td>
</tr>
<tr>
<td>14. Drinking Chocolate, Milo etc.</td>
<td>Cocoa plus artificial sweetener</td>
</tr>
<tr>
<td>15. Energy drinks</td>
<td>Water</td>
</tr>
<tr>
<td>16. Flavoured milk/milkshakes</td>
<td>Trim, Calcitrin or Lite Blue Milk</td>
</tr>
<tr>
<td>17. Fruit tinned in syrup (even</td>
<td>Fruit tinned in juice/artistically sweetened</td>
</tr>
<tr>
<td>lite syrup!)</td>
<td></td>
</tr>
<tr>
<td>18. Fried food</td>
<td>Boiled, grilled or baked food</td>
</tr>
<tr>
<td>19. Frozen yoghurt</td>
<td>Ordinary yoghurt</td>
</tr>
<tr>
<td>20. Fruit juice (except tomato</td>
<td>Fresh fruit [apple, orange, pear etc. + a drink]</td>
</tr>
<tr>
<td>juice and unsweetened</td>
<td></td>
</tr>
<tr>
<td>blackcurrant juice)</td>
<td></td>
</tr>
<tr>
<td>21. Glucose</td>
<td>Artificial sweetener</td>
</tr>
<tr>
<td>22. High fat crackers (≥ 10g fat</td>
<td>Lower fat crackers (≤ 10g fat per 100g)</td>
</tr>
<tr>
<td>per 100g)</td>
<td></td>
</tr>
<tr>
<td>23. Honey</td>
<td>*</td>
</tr>
</tbody>
</table>

24. Hot chips  *
25. Ice cream  *
26. Jam  *
27. Marmalade  *
28. Mayonnaise  Lite dressings/lite mayonnaise
29. Muesli bars  *
30. Muffins  *
31. Nuts roasted in fat or oil  Dry roasted or raw nuts (≤ 1 handful per day)
32. Pastries  *
33. Pies  *
34. Popcorn with butter or oil  Air popped popcorn
35. Quiches  Crushless quiches
36. Reduced cream  Natural yoghurt
37. Regular luncheon sausage  Low fat luncheon sausage
38. Regular powdered drinks    Water/Diet/Sugar free powdered drinks
   (e.g. Raro)
39. Regular salami  Low fat salami
40. Regular sausages  Low fat sausages
41. Regular soft drinks  Water/Diet soft drinks
42. Rollups  Fresh fruit
43. Sour cream  Natural yoghurt
44. Sugar [added to anything    Artificial sweetener
   including drinks, baking, cooking etc.]
45. Sweets/lollies  *
46. Syrups such as golden syrup,  Artificial sweetener
   treacle, maple syrup
47. Takeaways  *
48. Toasted muesli and any      Breakfast cereal with <15g sugar per 100g
   other breakfast cereal with ≥ 15g sugar per 100g cereal
   6g fibre per 100g cereal and <5g fat per 100g cereal (or <10g fat per 100g
   cereal if cereal contains nuts and seeds)
49. Whole Milk  Trim, Calcitrin or Lite Blue Milk
50. Yoghurt type products with ≥ 10g sugar per 100g yoghurt  Yoghurt (not more than one a day)

* No suitable alternative.
For further information about the development of these moderation guidelines please contact

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5.3 Overview of emerging themes

The themes that emerged from interview data could be characterised as either: a). Relating to previous weight loss experiences; b). Relating to food or dietary knowledge; or, c). Relating to perceptions and experiences of the Moderation Guidelines. Specifically, the emerging themes and corresponding subthemes were:

Relating to previous weight loss experiences...

1. Seeking solutions for weight loss, including:
   - Previous approaches to weight loss; and
   - Difficulties achieving adequate or permanent weight loss.

Relating to food or dietary knowledge...

2. Knowledge and ideas about food, nutrition, eating, and weight management, including:
   - Definitions of dietary moderation and related concepts; and
   - Inherent challenges of applying general concepts of moderation.

Relating to perceptions and experiences of NEEDNT Foods Moderation Guidelines...

3. Experiences of using NEEDNT Foods Moderation Guidelines, including:
   - Positive, negative, and neutral aspects of the Moderation Guidelines;
   - How the Moderation Guidelines influenced previous ideas of moderation;
   - Ways in which the Moderation Guidelines could be improved; and
   - Intentions for using the Moderation Guidelines in the future.

Themes one and two capture the bigger picture, contextual aspects of participants’ historical experiences of overweight and obesity, weight loss, and weight management, and, of their understanding of moderation in the context of diet. Theme three encompasses present-day,
topic-focused discourse, regarding participants’ experiences, perceptions and feedback regarding trialling NEEDNT Foods Moderation Guidelines.

5.4 Theme 1: Seeking solutions for weight loss

The preliminary interview questions asked participants to discuss and describe their previous approaches to pursuing weight loss, particularly, their experiences of adopting ‘diets’, ‘ways of eating’, or other lifestyle modifications, for the purpose of losing weight. Hence, the broad theme ‘Seeking solutions for weight loss’ emerged. Participants were asked to describe the process and outcomes of various approaches tried, and to share their thoughts regarding why these approaches were not effective or sustainable over the longer-term. Consequently, the naturally emerging subthemes were ‘Previous approaches to weight loss’ and ‘Difficulties achieving adequate or permanent weight loss’.

5.4.1 Previous approaches to weight loss

Eleven of the twelve participants described at least one previous attempt to lose weight by modifying their diet in some way. The dietary approaches fell into three general categories: A non-specific dieting approach (e.g. general healthy eating with a ‘reducing’ component, such as portion reduction, energy reduction, fat reduction, or food group reduction); a nutrition-related intervention facilitated by the university or a public health service lifestyle programme (e.g. a University of Otago study or Otago Heart Foundation course); or, a structured diet programme (e.g. a commercial weight loss programme such as Weight Watchers™ or a popular name-branded diet such as the Atkins™). Notably, participants differed in the relative extent of their total dieting experiences; three had no or little experience, three were moderately experienced, while six had a lot of experience.

A quarter of all participants (n=3) described themselves as having little or no experience with dieting or exercising for weight loss. Of these three, one participant described having no experience with dieting as such. Instead, this participant described adopting a way of eating,
without a focus on weight loss, based upon moderation and reading nutrition information panels. This individual’s approach developed in response to accommodating the needs of her spouse, while also being considered beneficial to herself.

Um, I have never actually been on a diet. I just tried to moderate what I ate. My husband [had] type two diabetes [so] I just sort of ate what he ate, ’cause I figured it would be better for me. Um, it was ok. Just learning to read the information on the labels of food. Not much really, only the sugar and fat content is what I looked at...

...It was at a time in my life when I was actually gaining some weight and it happened over time and I didn’t notice it happening. [Also] I started doing a bit more exercise. [After that] I didn’t gain any more [weight]. (Participant 11 – female)

Relatedly, two other participants had only marginally more experience. Their personal accounts were characterised by a casual period of dieting or exercising for weight loss. One participant described a one-off occurrence of following a name-branded diet, though had chiefly focused on trying to reduce overall quantities of food within their usual diet.

Sure, sure, look, um, there hasn’t been a lot [of diets]; it hasn’t been something I've been too concerned about. I mean, I've always been a fairly big fella growing up, but I've always been very active. These days I'm not so active, so I've put on some weight... ...So, um, I have, I did do the Atkins Diet at one time... ...really, um, I haven't, I haven't done any other really diets as such. Um, other than just, just, just looking at reducing quantities of food you know, cutting back on [it]. I know, um, when I went to my desk job, instead of taking two sandwiches for lunch, I dropped back to one, you know? (Participant 9 – male)

Another quarter of participants (n=3) described themselves as having some, or a moderate amount of experience with dieting or exercising for weight loss, each having tried at least one
structured dietary approach. One participant described their experience of following an approach based upon recommended servings from main food groups.

I ‘spose my diet, here with [the University]. [That was] a few years ago now. [It] was quite successful [but it] didn’t last very long. That was eating certain types of foods, and certain amounts of certain foods. [From] memory it was three portions of vegetables, two portions of fruit, so many portions of grains and protein; that sort of thing. I lost about two stone I think. [Then] I had a stroke in about 2009 and [became] a lot less active [and] put on weight. [Since then] occasionally [I’ll] give up beer for a month, but ah, nothing too much. (Participant 4 – male)

Another moderately experienced participant had progressed from a general approach of ‘cutting back’ to a more quantified method of calorie counting, utilising a dietary smartphone app.

Oh, um so I have tried various things but mostly things like calorie counting and so on [and] it’s been more or less successful. [I’ve] been currently using something [called] ‘MyFitnessPal’, which just and electronic way of monitoring things and it’s really convenient. [It’s] usually got whatever it is I’ve eaten. And you’re just estimating anyway after all. [Before that it was] just generally thinking about eating less, and not having second helpings, and cutting down between meals... (Participant 3 – male)

The remaining half of participants (n=6) described themselves as having extensive experience with dieting or exercising for weight loss. Three of these had predominantly chosen diets characterised by high-protein and low-carbohydrate intakes, which aim to induce ketosis. One participant recounted their experience of repeated cycles of a carbohydrate-restricting approach.

I suppose I’ve tried various things. I’ve tried [a] body-typing diet, which kind of got you to answer a few question about whether you were headed towards the
carbohydrate end of the spectrum [but] it wasn’t particularly effective... [Then] about five years ago I got introduced to an eating programme through Amway of all places; where they sell their supplements and things. But that was a diet that ‘bought me into ketosis’ as they put it, and I did lose weight. I found it quite easy to do it actually. I was living on my own; I was only looking after my own food and that sort of thing.

(Participant 10 - male)

The remaining three participants with a lot of previous weight loss experience had each tried multiple dietary approaches, or, had attempted the same or a similar diet numerous times.

Hahaha, [I’ve tried] the whole lot – I've been doing one diet or another since I was probably twenty-one and with each one I've collected more weight as you do... ...and it's been an on-going thing for most of my adult life really... ...I think I’ve tried everything that's out there, yep... ...Yeah, Jenny Craig, Weight Watchers, The Best Way (when it was going), um, what else have I done? The Zone, uh not the Zone, the Atkins one, Dukan... ...What have I missed? I've probably had a good go at most of them that are available... ...There’ve been ones that have been run through the [University]... ...[I] go for the weight loss ones... (Participant 6 – female)

5.4.2 Difficulties achieving adequate or permanent weight loss

All but one participant spoke of discontinuing previously adopted dietary approaches after a period of time. Participants discussed the processes and outcomes of discontinuation. The given reasons for ceasing previous diets, or for subsequent weight regain, could be considered to be either internally or externally oriented. Internally oriented factors were those pertaining to the person themselves, such as their behaviours and habits, personality and temperament, attitudes and beliefs, or knowledge and skills. Conversely, externally oriented factors were those relating
to matters outside of the self, such as the dietary approach itself, social and family influences, life circumstances, and environmental factors.

Some participants attributed their lack of long-term success to the temporary nature of their behaviour change, by conveying issues regarding motivation and consistency, in relation to actions and habits.

I’m not really consistent with, like, if I choose to eat healthy then I’d eat healthy for a few days, and then jump off the wagon and then I’d stay off. And then I would decide to go healthy again, like, I’m just not consistent with how I choose my diet... I think I just get really lazy and just can't be bothered sometimes... (Participant 2 – female)

For some participants, the transient nature of behaviour changes manifested in patterns of repeated dieting and weight-cycling.

Yeah, I can lose weight and keep it off for a while but it's never permanent. It's something that I would have to manage always, and I, yeah, I get lazy, I get slack about it, and then it will come to a crunch and I'll go 'Right, it's time for another diet' and away I'll go and I will lose weight when I do them. But yeah, it varies how much I lose and how long I stay on it, and how long the weight stays off. (Participant 6 – female)

Some participants described internal factors (emotions, coping skills, eating habits) and external factors (stress, social situations, highly palatable foods) as having an influence on their choices and responses to certain foods.

My diet’s always been bad, and my go-to foods for when I’m feeling stressed – you know my rewards for having a long hard day – are like cream donuts or you know a curry... ...which is quite creamy... usually cream-based actually. (Participant 7 –
female)

I think it is something that has to be every single day. For me it has to be in my
consciousness every single day. I get lazy. I get bored... ...I go to food when I’m
bored... ...I do know that, but it’s struggling against that... So um, yeah, absolute
laziness and, and I know that I have this thing about not, not missing out. So like if
there is cake in the tearoom, I will want a piece of that, not to being able to say no is
really difficult. So that sort of thing for me is, it means I don’t stick to things.

(Participant 8 – female)

Participants discussed a variety of negative aspects of the diets themselves, which they regarded
as rendering the diet fundamentally too difficult to sustain. Their discourse encompassed issues
pertaining to cost, practicality, health considerations, hunger, tastes, food variety, and dietary
rules.

[The Atkins diet] was difficult, it was hard work to actually have that food in the
cupboard and have those snacks at hand... ... and it was expensive. And, um, I don't
think it, I don't think it's really good long term for your health to be eating all that
stuff, you know. I, I, I didn't have my cholesterol and stuff checked, but I'd imagine
that it wouldn't be so good, for all that fat and, and, um, and protein and so forth.
But ah, it was an effective way of actually dropping a bit of weight off in a hurry, and I
think that's what a lot of people use it for. I don't think you can do it; I don't think it
would be wise to do it on going. And, and, and I think losing weight probably needs
to be more of a life-style change than dieting. (Participant 9 – male)

Relatedly, one participant decided to cease a commercial weight loss programme following
negatively-received dietary advice.

I did Jenny Craig for a bit. I didn’t finish it because at that stage I was – well I’m still –
a heavy coffee drinker, but I used to take sugar in my coffee, and coffee’s been my only kind of treat. It’s the one thing that you know I [never] reduce or never back off on. And she told me that I needed to start having coffee without sugar and I got really angry. And so I stopped going to her. I couldn’t stand her after that [but] funnily enough, afterwards I started [having] my coffee without sugar. And I don’t have sugar anymore, so, but I tried Jenny Craig and that wasn’t that successful.

(Participant 7 – female)

For numerous participants, however, cessation of the diet was an inherent and expected part of the design, rather than a conscious choice made by the user. Several participants communicated difficulties maintaining weight loss upon returning to usual (default) eating habits.

I went through about four or five cycles of that [carbohydrate-restricting diet] and lost about 43kgs and was really happy with myself.... ...[But] as soon as I finished the last cycle, and started bringing carbohydrates back into my diet, my body grabbed every calorie it possibly could, and within about three months – and this is while going to the gym – I was back at 120 or 115-120 [kg] sort of thing. So [I] felt really quite betrayed by my body after that... [And] kind of disillusioned about all that. [I’m] still always very very interested in whatever I might be able to do to impact my weight. (Participant 10 – male)

Participants also alluded to externally-oriented factors, such as work, social functions, health crises, familial meal patterns, and physical activity, as directly or indirectly affecting their adherence to particular dietary approaches.

I stopped doing [previous diets]. They’re too regimented and they don’t fit in with normal family life.... ...When you live with a family, they rely on the whole family eating the same thing, um, and for me to say 'We’ve all got to do this; Fish and Chip
Tuesdays are out now’, it doesn’t work. Sooner or later you give in... ...you couldn’t cook two [separate family meals] a day. (Participant 4 – male)

Umm, being quite busy and working nights as well, so not being able to eat properly ‘cause you’re working all night and don’t finish work till ‘bout 6 in the morning, and then sleep till lunchtime and yeah, just sort of screwed me up. And then we have like heaps of functions, birthdays, weddings, and [they] all seem to coincide [with] when I start my new eating plan... ...trying not to eat lots of carbs and that’s like real tough. ‘Cause heaps of foods have carbs in them. (Participant 5 – male)

5.4.3 Theme 1: Summary of findings

Participants’ accounts of ‘seeking solutions for weight loss’ could be classified by relative degree; as having no or little, a moderate amount, or a lot of previous experience with dieting or exercising for weight loss. The one participant with no dieting experience per se experienced attenuation of weight gain, by ‘moderating’ her diet based upon nutrition advice from Diabetes New Zealand. Yet collectively, participants’ efforts to eat more moderately, by ‘eating less’, ‘cutting back’, ‘being more conscious’, or ‘eating healthily’, had not resulted in changes sufficient to achieve adequate or permanent weight loss over the longer term. Furthermore, participants with a relatively extensive dieting history experienced concomitant weight-cycling or weight gain over time, and a sense of disillusionment regarding permanent dietary solutions to losing weight. Difficulties achieving adequate or permanent weight loss involved multiple interrelated factors, some within and others outside of, the person’s immediate control. Finally, some participants expressed all-or-nothing thoughts and behaviour patterns, symptomatic of chronic dieting behaviour; alternating between strict weight loss dieting and excessive-style eating patterns.
5.5 Theme 2: Knowledge and ideas about food, nutrition, eating, and weight management

The subsequent interview questions asked participants to describe exactly what ‘eating in moderation’ meant to them, for example, how they defined, understood, or interpreted the concept of ‘moderation’, within the context of food, body weight, and overall diet. Therefore, the naturally emerging broad theme was ‘Knowledge and ideas about food, nutrition, eating, and weight management’. Participants offered their thoughts about healthy eating, factors influencing eating behaviours, and the implementation of dietary moderation principles in real life. Hence, the emerging subthemes were ‘Definitions of dietary moderation and related concepts’ and ‘Inherent challenges of applying general concepts of moderation’.

5.5.1 Definitions of dietary moderation and related concepts

Participants used a variety of words, phrases and examples, to describe their historical understanding of dietary moderation, that is, prior to the commencement of this study. Moderation was described in terms of quantity eaten, frequency of intake, and quality of food choices, as well as by dietary variety, and energy balance. Participants also discussed food groups and macronutrients as well as general healthy eating. One participant described their understanding of dietary moderation in in this way:

Umm, I guess it was a combination of things. It’s about eating the right, the right foods, and the right amounts of the right foods. And, but also I guess about the realisation that you’re not always going to be able to eat perfectly [and] that when you do have something that maybe you, umm, that you shouldn’t eat or, you know, you realise that it’s not necessarily, umm, good for you, again that you don’t really go overboard on it, or that it doesn’t become a regular thing, umm, for you. So I guess that would be, yeah, the right amount of the right food and limited amounts of umm things that you know maybe aren’t so good for you. So I guess that would be the
Another person spoke of dietary moderation in terms of achieving energy balance, eating less saturated fat, eating fruits and vegetables, limiting occasions of overeating, and focusing on health rather than body weight.

Eating in moderation is [keeping] your energy input down to at least what your [energy] output is. ...[There’s] plenty of data to suggest that if you eat a lot of animal fat, there’s a higher morbidity and mortality, so you should probably avoid that. Umm so it’s eating fresh fruit and vegetables and all those things; you know that food pyramid, that whole thing. I don’t really see that as being about weight. I see that as being about optimizing your life... ...And occasionally you’ll eat a lot of something but you probably want to make sure that you don’t do that too often. (Participant 3 – male)

Conversely, one participant expressed uncertainty in their interpretations of dietary moderation, though deduced the concept may relate to information gleaned from a community education course.

I just had no idea what [moderation] was, or I would eat everything in moderation but they don’t actually tell you what that is. For me it kind of seems like it’ll be different for each person... ...I just couldn’t get my head around it... ...it was just like, probably that whole portion size thing, sort of, would be what [moderation] was, but [that] doesn’t look like much food, or much fun at all. I did the heart foundation course thing last year and they were telling us about portion sizes and stuff. Yeah, it was pretty full on. (Participant 5 – male)
5.5.2 Inherent challenges of applying general concepts of moderation

All twelve participants acknowledged that prior to this study they did not eat in accordance with their personal definitions of dietary moderation, though most believed that eating in moderation would in fact allow them to move towards a healthier weight. One participant described having no difficulty moderating foods from main (essential) food groups, but found it hard to moderate sweet and fatty foods.

Oh I think I would [achieve] a healthy weight. ...At the moment I’m obese [so] I probably wouldn’t [become] average [weight] but I might [get down to] the lower overweight [range]. ...The amount I eat of – normal things – is moderate; is correct. ...For me [it’s] those times that I can’t moderate myself or [I] don’t moderate myself, yeah. ...If I could get my head and my body around [what] being moderate [is] in my food choices, I think my weight management would be fine... ...I understand moderation from the point of view of not [having] excess sugar and fat and you know, like, I know all the theory of it. So I do know that, absolutely. [But] moderating my sweet intake; I find very difficult – [both] fatty and sweet [foods]. (Participant 8 – female)

Comparably, another participant conveyed having a sense of dietary moderation as being about portion sizes, yet found it hard to know precisely how much to eat.

I [think] eating in moderation [is] just keeping an eye on your portion size and making sure, you know, you’re not eating more than what you need. [So] I should probably eat less than I do, but I don’t have a good idea about the amount I should be eating. [I recently learned about] the whole ‘half a cup of muesli’ thing [which] was really helpful to me, and it sounds so simple. But it’s just knowing how much you can have, and it’s just so easy to measure it out, rather than have to go ‘oh that looks like I’ve
had enough’. So that’s something that I find helpful, is knowing exactly how much to have. (Participant 12 – female)

5.5.3 Theme 2: Summary of findings

Overall, participants’ explanations of their prior concepts of dietary moderation were relatively abstract and imprecise, characterised by broad phrases such as ‘eating normal amounts of normal foods’, ‘trying to eat healthy, smaller meals’ and ‘only having junk food in certain amounts’. One participant suggested gauging the ‘right amounts’ through ‘awareness’ and ‘listening to your body’s hunger’. Several participants mentioned limiting ‘junk foods’ or ‘snack foods’, including ‘chocolate, chocolate biscuits, bakery food, chips, and similar types of foods’. Despite this, all participants reported a marked discrepancy between their concept of dietary moderation, and their practical application of dietary moderation, which was most pronounced for foods typically high in added sugars or fats, and low in essential nutrients.

5.6 Theme 3: Experiences of using NEEDNT Foods Moderation Guidelines

The final interview questions enquired into participants’ perspectives and experiences of preliminary Moderation Guidelines. Hence, the broad theme ‘Experiences of using NEEDNT Foods Moderation Guidelines’ emerged. Participants were asked to share any and all views pertaining to their experience of learning and following the Moderation Guidelines, and, if and how the Moderation Guidelines had altered their understanding of dietary moderation. Therefore, emerging subthemes were ‘Positive, negative, and neutral aspects of the Moderation Guidelines’ and ‘How the Moderation Guidelines influenced previous ideas of moderation’. Additionally, the study researcher sought feedback regarding recommendations for improving and developing preliminary Moderation Guidelines, and, if and how participants would utilise the Moderation Guidelines in future. Accordingly the concluding subthemes were ‘Ways in which the Moderation Guidelines could be improved’ and ‘Intentions for using the Moderation Guidelines in future’.
5.6.1 Positive, negative, and neutral aspects of NEEDNT Foods Moderation Guidelines

Of the twelve participants, nine participants expressed an overarching impression that was predominantly positive, in other words, they generally ‘liked’ the Moderation Guidelines. Conversely, the remaining three participants formed a predominantly negative opinion, or, they generally ‘disliked’ the Moderation Guidelines. Participants’ reasons for forming a negative impression related to the way in which key messages were delivered, and the comprehensiveness of dietary advice. Some felt the nutrition messages were conveyed in a negative manner and that dietary guidance was incomplete.

The Moderation Guidelines were kind of weird [to] me, in [that] they’re helpful, but the way [they] structured themselves; they come [from] a negative argument, as in, these are NEEDNT foods, or you know, not to have them [so] they’re focusing on what you’re not having, rather than what you are having. I was kind of left a wee bit ambivalent about what a good day would be [or] should be... (Participant 10 – male)

The majority of participants, however, found the Moderation Guidelines largely appealing and permissive, inferring the inherent message as being about personal choice and flexibility.

It’s just helped with making decisions about things I can eat. When I feel like having something like sausages or fish and chips, [I] look at the list [and] I can [choose] things that I could eat that I feel will satisfy me, and are within my number of points for that day or that week... ...it’s positive. That’s what I liked most about it. When I was reading through it [I thought] ah ok, this isn't a whole lot of things that I can’t have, it's things that I can have. So long as I don't have 4 sausages, I can have 2 sausages, and it’s not like being naughty... ...[So I] feel [I] can continue with it, rather than losing the willpower to continue. It’s not a diet, it’s just a way of eating, which I
like... (Participant 11 – female)

Of the nine participants who ‘liked’ the Moderation Guidelines, eight participants’ self-reported good adherence, that is, they generally observed the instructions and recommended NEF quotas outlined therein. In contrast, one participant ‘liked’ the Moderation Guidelines in principle but self-reported poor adherence, regarding the process of identifying and remembering NEEDNT foods and beverages and of calculating NEF values, as too challenging.

That was one of the difficult things – [it] was hard for me to keep track of my NEFs because I was just picking away at like random stuff... ...I didn’t want to [have to] think about the ingredients or what was in the foods, ‘cause they might be a NEF, so it was easier if I just avoided it. [And I kept] forgetting what was in the list and all that stuff, and [I didn’t do] stuff that I should’ve done, like keep actual records and try to keep an accurate count of what I was eating... ...And like during the study I ate quite a bit of bread. Like quite a lot of bread actually just ‘cause like that was the easiest thing that wasn’t on the list... ...all I was eating was toast and cheese, or like toast and vegemite, or toast vegemite and cheese. (Participant 2 – female)

Of the few participants who expressed a negative impression of the Moderation Guidelines overall, one still self-reported good adherence, which they conveyed resulted in a weight loss outcome over the 4-week period. Despite initial concern regarding the lack of guidance outside of limiting NEEDNT foods and beverages, they deduced retrospectively that their core diet was not excessive.

The thing that came home to me would be the ‘embellishment’ of the food, or the ‘embellishment’ of having a coffee [with] biscotti or a biscuit at home [and] those sorts of things... [The Moderation Guidelines] provided some strategies for reducing embellishment of food [while having] just enough for a bit of a taste... it’s just given
me a wee bit of structure [and the] realisation of how much unnecessary embellishment I do put on food [or] to my meal. I got 4kgs [of] weight loss just by removing [and] being aware of how I was embellishing things; [outside of this] obviously I’m not grossly overfeeding myself... ...getting rid those little extras [made] an impact on my body... (Participant 10 – male)

Eight participants described both ‘liking’ and generally adhering to the Moderation Guidelines overall. These participants referred to the Moderation Guidelines as ‘simple’, ‘easy to follow’, ‘sustainable’, and ‘based on common sense’. They particularly liked that the Moderation Guidelines were ‘unrestrictive’, unregimented’, and ‘flexible’.

I think it’s sustainable, and I think you could actually stick to it reasonably well. Ah, it’s not unrealistic, and as much as it talks about quantities you can have – and of course, depending on the size of the person that you are, there’s variance there – but it doesn’t matter how big or how small you are; you can make up a difference with your central foods, so, it’s just focusing on that one type of food that's not good for us... I like it. I think it makes sense... [And] if you wanted to have yourself a treat, you could have a treat; [people] just don't like saying you can't have it. You can have it, but it's at a cost [and] you might sacrifice something else, [for instance] I really want to have a beer tonight, so I'm going to make sure that, you know, I'm not going to use up my points for the day at lunch time by having a piece of cake, you know, 'cause I'm gunna have those beers tonight. So you can see you got choices, you know, and people like to have choices. (Participant 9 – male)

Two participants, however, conveyed ‘disliking’ and generally not adhering to the Moderation Guidelines. These participants felt the Moderation Guidelines were ‘uninspiring’, ‘incomplete’, ‘not motivating’, and ‘overwhelming’. Furthermore, these participants conveyed a sense of
needing broader dietary guidance and additional support to address reasons for eating other than physical hunger.

I didn't find this as motivating. Normally if I've got something new to try, I'm in there giving it 110%. And when I read this, it didn't inspire me, and I don't know if that was because [it’s] just a minimal programme, or whether it was the timing of what else was going on in my life, I don't know. But it just feels like it needs more – a menu plan, um, guidelines on other foods. But in saying that, [that’s] not anything that I haven't had before, or have drawers full of at home. (Participant 6 – female)

The other participant spoke of not having pre-established habits around structured meal patterns and a lack of cooking skills. For this reason, she considered herself lacking the requisite skills to effectively apply the Moderation Guidelines.

I don’t think that I would work for this. Umm, do you know what I mean? [There are] too many difficulties [and] I have too many bad habits at this stage to come into something like this [programme] and make this work. For somebody else who has more of a structured way of eating [then] I think [these Guidelines] would work. But I think for me personally [there] are too many flaws in the way that I live, and the way that I eat, that this is never going to work for me... ...For me [the Moderation Guidelines are] just extra work because I’m starting from such a poor base. I actually have to start right from scratch. And so it’s a huge mountain. (Participant 7 – female)

Several participants spoke of inherent difficulties in adhering to the Moderation Guidelines during social situations, especially those where they had little control over the food provided, and little knowledge of the ingredients or cooking methods. However, participants also acknowledged the particular importance of being aware of NEEDNT food and beverage consumption in such situations.
Largely the being out and about [is difficult]... Like, it’s very easy to follow the Moderation Guidelines when you’re eating most of your meals at home, or you know, preparing most of your meals at home. But as soon as you start going out with friends and socializing, or you go out for conferences, or those sorts of things – that’s where following the Moderation Guidelines becomes more difficult, but arguably probably more necessary at those times, ‘cause it’s very easy to stack up a lot of NEF’s, very quickly. (Participant 1 – male)

Although weight loss was not a measured outcome of the study, five participants voluntarily self-reported weight losses (2-4 kg each) over the 4-week study period. One participant was motivated to continue using the Moderation Guidelines after losing weight during a typically challenging time of year.

Well I lost weight quickly, I was quite surprised... [and] if you lose half a stone in four weeks, then I ‘spose if you do this for three months, then you might lose a stone or more... ...[And that’s while] it’s been Christmas [and] I’ve been on holiday... ...[So] I thought I might follow on with [the Moderation Guidelines] for another three or four months and see what happens. (Participant 4 – male)

5.6.2 NEEDNT Foods Moderation Guidelines and previous ideas of dietary moderation

Participants also relayed the influence (if any) of the Moderation Guidelines on their pre-existing concepts of dietary moderation, outlined within Theme 2. Most participants felt the Moderation Guidelines had provided them with a practical mechanism for quantifying their theoretical understanding of moderation.

It’s just given me a scale I guess in which to work with these things – an idea of the serving sizes and the relative [and/or] different NEF values for different things. [It]
gives you an idea of how much you should be moderating different things [and] a scale to apply to moderation. Which is perhaps more realistic [than] when I said that, yes [I do] listen to my body [but] when I was in situations where it wasn’t so easy to [listen to my body] well, this [is] sort of like, if you’re driving a car and [if] your petrol gauge wasn’t working... [The Moderation Guidelines] compensate a little bit for that inability to always be able to listen to my body and what it’s telling me. (Participant 1 – male)

Other participants identified that, since following the Moderation Guidelines, their concept of dietary moderation had changed in respect to portion sizes.

Yes, from the point of view of how much – the amounts, quantities. So yes it [has].

Even from the point of view of how much butter to put on the bread or whatever, [and] the creams were a great one for me. ...The amount that I would now see is being a moderate amount to have has changed a little bit. I would have less of those things now. (Participant 8 – female)

A few participants mentioned changes in their perceptions of foods they had formerly considered ‘healthy’. One participant previously thought of muesli as ‘healthy’, but realised their usual brand contained a relatively high amount of added sugars. Another participant previously purchased foods such as yoghurt labelled ‘99% fat free’, but later learned these foods often ‘compensate’ with added sugars.

5.6.3 Ways NEEDNT Foods Moderation Guidelines could be improved

All participants offered suggestions for how the printed Moderation Guidelines booklet might be improved or developed, to enhance the usability and scope of application. Suggestions pertained to the content, design, arrangement, and functionality, the extent of nutritional information provided, and the potential for adjunct support.
Participants unanimously requested the rearrangement of NEEDNT items, into more consumer-friendly food and beverage categories and subcategories, to aid searching and finding and improve accuracy and adherence. Importantly, some participants located specific items, for the very first time, while leafing through the printed Moderation Guidelines booklet during the post-study interview. While some participants acknowledged not reading the Moderation Guidelines properly, for many, the terminology and categorisation itself was the principal barrier. Examples of items not located by category included mayonnaise and aioli (listed under ‘Fats, Creams and Butters’); slices and muffins (listed under ‘Baking and Desserts’); bacon and frankfurters (listed under ‘Processed Meats’); kebabs and battered fish fillet (listed under ‘Fast Foods and Takeaways’), sorbet (listed under ‘Desserts and Puddings’), and ‘fizzy’ drinks (termed ‘soft drinks’, listed under ‘Beverages’). Relatedly, participants suggested food categories and subcategories appear in a more logical order within the print booklet, for example, repositioning ‘Dairy Products’ next to ‘Fats, Creams and Butters’, and relocating savoury groupings such as ‘Processed Meats’, ‘Pies, Savouries and Pastries’ and ‘Fast Foods & Takeaways’ to appear next to one another. Other suggestions for improving the print booklet pertained to graphics, layout, and use of colour. For example, one participant with a design background suggested the use of images or graphics, using real-world objects (food or non-food) to illustrate serving sizes. Some participants felt the explanations for serving sizes were open to interpretation or ill-defined, and that the addition of graphics (or consistent use of weights or metric equivalents) may address this issue. Also recommended was the use of different font colours to distinguish the separate NEEDNT food and beverage categories and subcategories. Finally, it was suggested that each NEEDNT category begin (and preferably end) on a new (single) page, rather than ‘running over’ several pages.

For those who were content with the print format, some suggested a supplementary, one-page ‘cheat-sheet’ resource, characteristic of the originally published NEEDNT Food List™ (Appendix M; page 215). One participant took the initiative of typing up the entire Moderation
Guidelines, with corresponding serving sizes and NEF values, on an A3 sheet, which he placed on his fridge for the family to refer to. Further to the recommendations for improving the print booklet, four participants strongly favoured the development of a Moderation Guidelines smartphone app. These participants felt that an app and accompanying website would allow for a comprehensive, updatable dataset of NEEDNT foods and beverages and NEF values, while also improving usability and facilitating habit-forming through convenience. Furthermore, participants thought an app would likely resolve many issues pertaining to categorisation and terminology, given that digitally categorised NEEDNT foods and beverages could be searched and found through multiple synonyms and avenues.

I think that this in an app format would be really useful, so that [the] database behind it could be kept up-to-date, and you could add to it [and] develop another sort of a way where you can kind of find what you want. [Plus] I don’t know how accurate [the print format] is – one sausage is not like another, so there is a certain amount of variation and you have to make estimates. So that would be helpful and [again] it’s about generating those habits and if you get into the habit of remembering, ‘Ok that’s one of those things that I probably should avoid’... [and] for example if that app said ‘here is the NEEDNT value of your day’. (Participant 3 – male)

Several participants said they would have liked further dietary guidance to complement the Moderation Guidelines. For example, one participant found the Moderation Guidelines a useful tool for raising consciousness and decreasing intake of NEEDNT foods and beverages, however, wanted further information on the four main food groups, including recommended number of daily servings and examples of standard serving sizes.

I think that’s one of the things I do have a problems with is portion control, because I’m just not sure of the sizes... [So] I’ll probably try and keep on following the
Moderation Guidelines or at least being more aware of what I’m eating. [But] I’d like to find out more about portion sizes [for all foods]. I think that’s something I definitely need to do. [And] just try and be more conscious about what I am eating and the amount of it… (Participant 12 – female)

Others observed that the Moderation Guidelines only dealt with a proportion of one side of the energy equation, and requested all-inclusive advice regarding energy balance for weight loss and maintenance.

Whatever my main course was, [it was] probably [too much] – as I said energy in, energy out, [and I] wasn’t doing any exercise so that meant my meal sizes should be smaller, but they’re not. [So] I think having somewhere [in the] booklet [information about] the whole energy intake and energy [output]. [The] whole package; not just [NEEDNT foods and beverages]… …Yeah [I’d like] guidelines around food; other food, [and] guidelines around energy out, so exercise or something as well. (Participant 12 – female)

Some participants also voiced a need for a contact person, preferably a dietitian or GP, to troubleshoot miscellaneous questions as they arose while following the Moderation Guidelines. Topics participants requested clarification on included: the reason for ‘cheese’ not being on the NEEDNT Food List™ while other high fat dairy products were included; the logic of ‘diet’ or ‘artificially-sweetened’ soft drinks being permissible, as compared to fruit juices (which contain some nutritional qualities); how to calculate NEF values of ‘home-made’ versions of ‘takeaways’; practical examples of what a ‘NEF-free’ would look like; and how to estimate NEFs for foods prepared by others (e.g. unknown ingredients or preparation methods). Also, some participants found the recommended daily and weekly NEF quotas were unachievable and demoralizing, and suggested NEF quotas could be individually customised, depending on a person’s goals and baseline diet.
My last two weeks were like really bad, in terms of like the NEFs that I went over with... ...I think with the amount of NEFs that’s given, I think [the] person should be able to choose how many NEFs they get per week. But then [the] amount of NEFs they have goes down [so] they could start at like 25, and then slowly make their way down to [the recommended] 19 [per week] ...until it just becomes normal... ...I would feel real stoked if I like stayed under or like just made it [but] then if I’d go over I’d feel real gutted... [Then] I would just be like ‘Ah stuff this NEF thing’ I would just eat whatever I want, like, I’d just have that mentality, just ‘cause I was quite negative. But like if I stayed under [the quota] I’d be really encouraged that I could do it... ...[It’s] just the whole mentality thing. (Participant 2 – female)

Yeah umm, I think the only other thing is [because] of how extensive the list of foods are, that made it really difficult [to meet the quotas]... ...coming from someone who has a very poor diet and very poor eating structure [in] their lives. So I don’t know how somebody who has, you know, a better [dietary] structure might view that... ...And maybe it’s a factor of my diet that it just felt like it was everything almost. Everything that I ate had an aspect that fell under, umm, these particular list of foods... ...once it was recorded I kind of realised how much, how pervasive those foods are, or at least for me [they’re] my whole diet. (Participant 7 – female)

Finally, two participants conveyed a potential need for auxiliary support to assist them in resolving emotional factors connected with eating habits.

Maybe [I need] more on the counselling side of things of why I’m eating. That’s what needs to be addressed, not what I’m eating, ’cause I know what to eat and what not to eat, I’ve been doing this for so long, yeah, it's changing the patterns [and] stopping the triggers. I don't always eat because I'm feeling miserable [but] it’s just ingrained
into me now [and] I’ll have put things into my mouth without even being aware that I got up and went and got them. So it’s changing those patterns. So it’s probably more outside the food that needs work. (Participant 6 – female)

5.6.4 Intentions for using NEEDNT Foods Moderation Guidelines in future

Seven of the twelve participants expressed an intention to continue following preliminary Moderation Guidelines in the foreseeable future (‘continuers’) whereas five participants said they did not plan to continue with the Moderation Guidelines (‘non-continuers’). Of the ‘continuers’, three planned to keep recording NEF values, while four intended to be generally aware of NEF values without necessarily recording them consistently. Of the five ‘non-continuers’, three still stated an intention to remain mindful of NEEDNT foods and beverages, while two participants did not intend to make use of the Moderation Guidelines in any way.

One of the future ‘continuers’ conveyed their motivation as being driven by their current focus on diet and weight management, the usability of the Moderation Guidelines, and their success in losing weight during the 4-week study.

I think I will continue to use [the Moderation Guidelines] because [I] do think they’ve been effective. I think a large part of that is down to my plans and the fact that I’m thinking about these things and considering [what] I’m eating [and] I think that’s [the] biggest part of it. [Following the Moderation Guidelines] gives me that couple a minutes [in the] evening to think about it and then that sort of sticks with me. ...For example [if] I’m going to lunch or I’m going out doing things, I will think ‘Ah what on this menu for example gives me very few or no NEFs?’ ...Using [the Moderation Guidelines] as a means to make decisions is quite useful. ...I do think it has [been] effective; I do feel like I’ve lost weight. [And] I think I would record. I think I need to have that time in the evening to continue to record. (Participant 1 – male)
Another future ‘continuer’ anticipated keeping a general awareness of total dietary NEF values, by using the Moderation Guidelines as an intermittent reference tool, when making food purchasing and eating decisions.

I’m going to keep [the] booklet on my bench, so that I’ve got it there when I’m thinking about what to eat, or what to buy for my groceries. [Because] you can't keep all that in your head [so I’ll] look it up and see; have the information there. [Though] I won't be writing down all the [NEF] points, just being aware of [them]. I’m not quite sure how I would keep track of what I’d eaten [during] the week if I don’t write it down, but I don’t know if I’d write [down] the points... [I’d] just have a quick look... ...because I can just easily look them up [and] make a decision about what to eat or what to buy [and] think ‘Well no, I’ve had enough [NEFs] this week’. (Participant 11 – female)

Of the future ‘non-continuers’, one felt that while the Moderation Guidelines were a suitable and effective tool for the mainstream populace, their personal preference for comprehensive data in a digital-format meant they favoured calorie counting through dietary smartphone apps.

I will carry on with [MyFitnessPal]; not [the Moderation Guidelines]. I mean, there’s a whole bunch of [calorie counting apps] and they’re all pretty much the same, [MyFitnessPal] was just cheaper. [But] I do think what’s in [the Moderation Guidelines] is really helpful, just to keep reminding you [to] avoid those [NEEDNT foods and beverages]... ...I probably won’t keep a record of [NEFs] but I will [have] a look through it from time to time. [So] that’s why I would like to see [the Moderation Guidelines] incorporated into [an app]. [If] you had the functionality that [MyFitnessPal] has [then] I’d switch to this. [Still] I think what you get [from the Moderation Guidelines] is [roughly] what you need [so while] it’s hard to speak for
other people [this] is a good start. (Participant 3 – male)

The two ‘non-continuers’ both conveyed an intention to reassess their approach to weight loss, however, largely felt that the Moderation Guidelines did not adequately address the particular circumstances influencing their weight management. One participant spoke of addressing stress levels as a way of facilitating better dietary choices, and the importance of learning how to implement dietary and lifestyle changes.

Well I’m not sure [what I’ll do]. A big priority for me is to get back to Bikram [Yoga]...

[Because] I know how I feel after a class, and [then] from that base [I can] make some better decisions [and] better choices. [But] I don’t know how to develop the habit of eating in a regular way. In particular a regular healthy way because I’ve actually never been taught it, and it’s like discipline... ...As an adult I lack the skills of discipline and I find that’s where I fall down in a lot [of] weight loss plans. Because they require discipline and I don’t have that tool... ...Yeah, I know what’s missing – I know what I’m lacking and in terms of my diet and in terms of my skills and my knowledge [but] I just don’t know how to make those changes. (Participant 7 – female)

Participants also offered vital reflections and considerations for applying the NEEDNT concept and the Moderation Guidelines across various community groupings, including individual household groups (family or flatmates) through to extended family, cultural groups (church and marae communities), and the wider public.

One of the things that I learnt was, if the people around you are taking part in it as well, I think that that would be really, really effective. [For] Pacific Island and Māori communities [you’d] want to implement diet change in a household; it’s better [than] a person. [So] if you were to implement [the Guideline’s principles] into me, it would be better if you got my entire household to take part as well, instead of just getting
me to do it, ‘cause if everyone else is [eating] KFC and stuff, it would be quite hard...

...[And] I think [for] most of the Pacific Island communities you’d definitely have to hit up the churches and get them involved [and] tell them about the resources... ...The churches are the way to go if you want to get into the Pacific Island communities. (Participant 2 – female)

I think it would be good for Māori definitely if you don’t use words like ‘diet’; they tend to shut up and close shop when you mention that word. [The Moderation Guidelines are] definitely something that could probably be adapted to [Māori], especially big Marae situations... ...I think [if] they had this kind of resource [then] people would find it easier, instead of being told what you can’t eat: ‘You can’t eat this, you can’t eat that’. Generally people tend to close down when you tell them [they] can’t do stuff.... I found [our first meeting] good ‘cause it made me actually go away and read this book like 12 times in the first 3 days. [Whereas] if you had told me all the info, I probably wouldn’t have even looked at [the booklet]; it actually made me go away and go, “Ah I’ll give a little read, Ah yep, sweet.” And the next day, go back and read through it again. So for me it was good. (Participant 5 – male)

One participant foresaw the potential to use the NEEDNT concept and the Moderation Guidelines as the basis for a public-health campaign, but did stipulate the importance of reframing key nutritional concepts as positive messages.

[The Moderation Guidelines] are very much ‘don’t eat so and so’ [and] I would want to put it in the context of ‘here are the things to eat’ if you were thinking about a public campaign... ...I wondered whether [the Moderation Guidelines] could be used more broadly, as a consciousness-raising thing. Because the concept seems really simple, you know, the idea that ‘here are a basic group of foods that you can avoid’.
That’s why I thought about the idea of [NEEDNT Food] substitutions, [for example] if you like so and so [NEEDNT Food] then try [a substitution] instead... ...[There’s] so much nutritional information available and most of it’s bogus [and] there’s so much money tied up in selling crap food. [So] I think you do need a good, strong public-helping message, which is, ‘No, you should stick with the basics’, fresh fruit, vegetables – as much as you can afford it – eat those basic things [and] avoid these [NEEDNT foods and beverages]... (Participant 3 – male)

5.6.5 Theme 3: Summary of findings

Overall, participants’ individual experiences and perceptions of preliminary Moderation Guidelines were diverse and complex. Three quarters of participants generally ‘liked’ the Moderation Guidelines, and of these, eight self-reported satisfactory adherence. Conversely, three participants generally ‘disliked’ the Moderation Guidelines, and of these, two self-reported poor adherence. Participants’ impressions and adherence was influenced by a combination of personal factors, including the relative extent and severity of previous dieting experiences, habitual dietary patterns and skills, and other psycho-emotional and behavioural factors. Some found the Moderation Guidelines flexible, comprehensive, easy to use, and sustainable, while others felt the Moderation Guidelines were restrictive, incomplete, and ineffective. While most participants’ ideas of dietary moderation were fundamentally unchanged, all considered the Moderation Guidelines contextualised dietary moderation; providing a valuable way of establishing unambiguous limits for non-essential foods and beverages, without which, can easily be consumed in excess. Suggested improvements were chiefly related to revising the organisation of NEEDNT foods and beverages into consumer-friendly groupings, or better yet, developing the Moderation Guidelines into a multi-functional smartphone app. Most participants requested additional dietary guidance or clarification, regarding the Moderation Guidelines, other (main) food groups, energy balance, or tailored
nutritional information. However, most acknowledged the implicit compromise between simplicity and comprehensiveness, and therefore favoured the scope of the Moderation Guidelines remaining fundamentally unchanged. Finally, more than half of participants intended to continue utilising the Moderation Guidelines, either strictly or as an intermittent ‘crosscheck’ of total NEEDNT food and beverage intake.
<table>
<thead>
<tr>
<th>Issue / problem</th>
<th>Recommendation / solution</th>
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<tbody>
<tr>
<td>Unsuitable naming of food categories and subcategories made it difficult to locate specific items. E.g. ‘Mayonnaise’ listed within ‘Fats, Creams, and Butters’.</td>
<td>Rename and reorganise foods into consumer-friendly groupings.</td>
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<tr>
<td>Difficulties locating foods known by more than one name (and only listed by one name in the booklet). E.g. “soft drink” vs. “fizzy drink”.</td>
<td>List food items in print booklet under all commonly known names. (NB: An app version would also address this issue by providing multiple search terms and avenues)</td>
</tr>
<tr>
<td>Alphabetical ordering of food categories resulted in illogical arrangement of food groups. E.g. ‘Baking and Desserts’ appearing next to ‘Beverages’.</td>
<td>Reorder food categories into more logical/intuitive groupings. E.g. Group all savoury product categories together, etc.</td>
</tr>
<tr>
<td>Subjective or ill-defined serving sizes made it difficult to accurately/confidently calculate NEFs. E.g. ‘1 standard sundae’ or ‘1 standard sized muffin’.</td>
<td>Use images/graphics of real world items, in additional to gram weights or metric quantities, to represent serving sizes. E.g. tennis ball, deck of cards, etc.</td>
</tr>
<tr>
<td>It was difficult to locate separate food categories as they were displayed ‘continuously’ throughout the booklet.</td>
<td>Start each food category on a fresh/new page.</td>
</tr>
<tr>
<td>It was hard to see where each separate food category started/ended because they were in the same font and colour.</td>
<td>Utilise appropriate colour-coding to denote different food groups. E.g. Use of red graphics/borders for meat products.</td>
</tr>
<tr>
<td>It would have been useful to have a ‘snapshot’ of all the NEEDNT foods and beverages rather than having to search through the entire booklet.</td>
<td>Create a supplementary 1-page ‘cheat sheet’ similar to the original NEEDNT Food List™.</td>
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Table 3. Summary of participants’ recommendations for enhancing the NEEDNT concept and preliminary NEEDNT Foods Moderation Guidelines
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<th>Issue / problem</th>
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<tr>
<td>The print booklet wasn’t appealing/convenient/usable. An app or web-based version would be more functional and up-to-date.</td>
<td>Develop/embed NEEDNT Foods Moderation Guidelines into a Smartphone app and accompanying website using comprehensive search and find terms and functionalities.</td>
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</tbody>
</table>
| NEEDNT Foods Moderation Guidelines didn’t address the need for dietary guidance for non-NEEDNT foods and beverages and main food groups. | Provide supplementary dietetic support or materials on a case-by-case basis.  
E.g. Tailored advice regarding recommended number of servings and examples of serving sizes for main food groups. |
| NEEDNT Foods Moderation Guidelines promoted reducing NEEDNT foods and beverages but didn’t adequately cover the topics of ‘energy balance’ or ‘energy deficit’ relevant to achieving weight loss. | Provide supplementary dietetic support or materials on a case-by-case basis.  
E.g. Tailored guidance on energy requirements, the ‘plate model’ concept, portion sizes for main food groups, and physical activity. |
| The nutritional information within NEEDNT Foods Moderation Guidelines didn’t adequately address numerous individual food-related queries that arose during the 4-week pre-test period. | Provide supplementary dietetic support or materials on a case-by-case basis.  
E.g. Regular consults with a Dietitian or NEEDNT-trained GP or ‘coach’ for troubleshooting and answering queries. Develop an FAQ section within the (potential) app/website. |
| Some foods were considered ‘borderline’ or ‘grey area’ and users were uncertain how to or whether to equate for these in terms of NEFs.  
E.g. Homemade burgers vs. Takeaway burgers, etc. | Provide supplementary dietetic support or materials on a case-by-case basis.  
E.g. Providing further clarification of the NEEDNT concept to further empower users to use their informed discretion. |
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| It was harder to implement NEEDNT Foods Moderation Guidelines in situations where food was provided and ingredients/preparation methods weren’t easily known. | Provide supplementary dietetic support or materials on a case-by-case basis.  
E.g. Provide tailored guidance for implementing NEEDNT philosophies during social situations such as BBQs, brunches, and parties. |
| The pre-set NEF quotas were suitable/achievable for some users but unattainable for others. | Provide supplementary dietetic support or materials on a case-by-case basis.  
E.g. Utilise the NEEDNT-FFQ to ascertain baseline NEEDNT intake. Set individualised NEF quotas and incrementally reduce over time. |
| NEEDNT Foods Moderation Guidelines merely provided ‘quantity information’ and didn’t address common behavioural issues affecting food intake.  
E.g. Non-hungry eating, emotional/comfort eating, ‘yo-yo dieting’, binge eating, etc. | Provide supplementary dietetic support or materials on a case-by-case basis.  
E.g. utilise evidence-based motivational interviewing techniques, ‘stages of change’ model, etc. Combine with psychologist/counsellor or GP input as needed. |
| NEEDNT Foods Moderation Guidelines were inappropriate/too advanced for users lacking requisite cooking skills or pre-established meal/eating routines. | Provide supplementary dietetic support or materials on a case-by-case basis.  
E.g. Assess suitability/timing of introducing NEEDNT Foods Moderation Guidelines on an individual basis. Prioritise dietetic goals according to client needs and skill/knowledge levels. |
| The requirement of recording NEFs over the long-term was considered impractical. Users envisaged reduced adherence with recording at some future stage. | Develop ‘phases’ for NEEDNT Foods Moderation Guidelines as a systematised dietary ‘programme’, which can then be implemented by Dietitians and/or NEEDNT-trained GPs/coaches while working with clients.  
E.g. An initial phase (100% recording), followed by maintenance phase/s (intermittent/reduced recording) once goal weight is achieved. |
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<th><strong>Issue / problem</strong></th>
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<tr>
<td>The central message/viewpoint of the NEEDNT concept and NEEDNT Foods Moderation Guidelines is entirely negatively framed and this is fundamentally discouraging. E.g. The approach says you “can’t have” or must “limit” NEEDNT foods and beverages.</td>
<td>Restructure the NEEDNT concept into a positively framed message, while still limiting NEEDNT food and beverage intake to ≤15% of average estimated energy requirements. E.g. Accrue positive points for meeting recommended number of servings from main food groups and/or for every instance of choosing those foods over NEEDNT foods and beverages, etc.</td>
</tr>
<tr>
<td>The functionality and nutritional scope of dietary apps such as MyFitnessPal™ supersedes that of a potential NEEDNT Foods Moderation Guidelines app.</td>
<td>Embed the NEEDNT concept into an existing dietary app, or develop a comprehensive NEEDNT-based dietary app from scratch. E.g. An app that provides a comprehensive food database and reports on % total energy or NEFs from NEEDNT items, as well as usual nutritional information (total energy, % composition of macronutrients, etc.). Could incorporate targets for servings from main food groups.</td>
</tr>
<tr>
<td>It was difficult for users to implement/adhere to NEEDNT Foods Moderation Guidelines on their own. E.g. Without household members/family members/flatmates also taking part.</td>
<td>Restructure and promote NEEDNT Foods Moderation Guidelines as a way of eating for families/households. E.g. Conduct dietetic consultations with families/households. Set family targets for NEFs.</td>
</tr>
<tr>
<td><strong>Issue / problem</strong></td>
<td><strong>Recommendation / solution</strong></td>
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<tr>
<td>Māori and Pasifika users expressed a strong preference for family or community-based delivery of nutrition messages, from respected leaders, rather than the current individualised approach led by a health professional.</td>
<td>Redesign NEEDNT Foods Moderation Guidelines to suit Māori and Pasifika households and communities. E.g. Implement through Māori and Pasifika representatives including culturally diverse health professionals, marae leaders, elders, and church ministers.</td>
</tr>
<tr>
<td>The NEEDNT concept is highly relevant to the population (not just obese individuals) and could be more effective delivered as a public health campaign.</td>
<td>Adapt and incorporate the NEEDNT concept into a public health campaign. E.g. Australia’s LiveLighter™ Campaign.</td>
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6 Discussion and conclusion

This concluding chapter is divided into five sections. The first section (6.1) summarises the key findings of the study. The next section (6.2) explores the usability and acceptability of the Moderation Guidelines, by comparing and contrasting key findings with relevant literature examined in Chapter 2 (Literature review). Areas of agreement or similarity, and areas of disagreement or ambiguity, are discussed in relation to: 1. Energy-dense, nutrient-poor dietary patterns, obesity, and weight management; and 2. Participants’ perceptions and experiences of the Moderation Guidelines, as a tool for facilitating weight loss and improving dietary quality, through moderating NEEDNT food and beverage intake. Unforeseen findings, which arose from the qualitative nature of this study, are discussed in relation to relevant supplementary literature. Subsequent sections discuss potential limitations of the study (6.3) and implications for future areas of research (6.4). The final section (6.5) provides the conclusions of this research project.

6.1 Summary of key findings of the study

The aims of this qualitative pre-test study were three-fold: firstly, to create a points and quota system for quantifying and monitoring energy intake from NEEDNT foods and beverages, thus forming the technical basis of the Moderation Guidelines; secondly, to pre-test the usability and appeal of the Moderation Guidelines, while also exploring insights relevant to weight loss and dietary moderation, among a representative group of potential future users; and thirdly, to make recommendations to further develop the Moderation Guidelines, into a fully revised and comprehensive tool for facilitating weight loss and improving dietary quality in obese individuals.
6.1.1 Theme 1

Findings from the first emerging theme, ‘Seeking solutions for weight loss’, demonstrated that participants varied greatly, in terms of the relative extent of dieting experiences, and in the range of different dietary approaches tried. Those with no or little experience had tried, unsuccessfully, to ‘moderate’ their habitual diet, by reducing portion sizes, eating less frequently, or choosing healthier foods. However, attempts at moderation did not result in adequate or permanent weight loss. At the other end of the spectrum, several participants had undertaken more extreme, fad-style diets, and experienced repeated cycles of weight loss and regain, and long-term weight gain overall.

6.1.2 Theme 2

The subsequent emerging theme, ‘Knowledge and ideas about food, nutrition, eating, and weight management’ revealed the largely imprecise or abstract nature of participants’ definitions and concepts of dietary moderation, prior to commencing the present study. Intangible descriptions such as ‘eating normal amounts or normal foods’ and ‘limiting junk foods’ were common. Participants were unanimous in saying that, prior to the present study, they did not eat in accordance with conceptual ideas of moderation, though believed they would likely lose weight if they did.

6.1.3 Theme 3

The third emerging theme, ‘Experiences and perceptions of NEEDNT Foods Moderation Guidelines’ revealed participants’ overall impressions of the Moderation Guidelines were somewhat polarised and complex. While the majority liked the Moderation Guidelines in the preliminary format, a quarter disliked the Moderation Guidelines, finding them fundamentally unappealing. Surprisingly though, liking the Moderation Guidelines was not always synonymous with adherence. Both liking and adherence (the key determinants of usability and acceptability) were contingent on interrelating factors, such as: the content and presentation of
the Moderation Guidelines themselves; gender; the extent and severity of previous weight loss
dieting experience; habitual eating patterns; readiness to change; stress, and other psycho-
emotional and behavioural factors. The majority of participants found the Moderation
Guidelines an appealing and highly usable dietary tool, which provided targeted and quantified
guidance for consumption of ‘problematic’ foods. Conversely, a subgroup of participants found
the Moderation Guidelines unappealing, and interpreted the principal messages as restrictive
and demotivating. Furthermore, some thought the sole focus on NEEDNT foods and beverages
rendered the Moderation Guidelines inadequate as an independent dietary tool for achieving
weight loss.

6.2 Factors influencing the usability and acceptability of NEEDNT Foods

Moderation Guidelines

6.2.1 Obesity and historical attempts at weight loss

In the present study of obese individuals, eleven of the twelve participants had a history of
repeated weight loss attempts and impermanent weight loss. This trend of recurrent dieting and
weight-cycling was also common in overweight and obese participants across all five of the
qualitative studies that explored historical weight loss experiences (Adolfsson et al., 2002;
Allan et al., 2011; Bidgood & Buckroyd, 2005; Herriot et al., 2008; Morgan et al., 2011). Like
participants of Morgan et al. (2011) a lack of long-term success was often attributed to the
fundamentally unsustainable nature of some of the previous dietary approaches. Participants of
the present study also attributed unsuccessful weight loss and enduring obesity to emotional
stressors, behavioural factors and lifestyle barriers, all of which had a negative effect upon
habitual eating habits. These factors are consistent with historical accounts of overweight and
obese participants in previous studies (Adolfsson et al., 2002; Bidgood & Buckroyd, 2005;
Herriot et al., 2008; Morgan et al., 2011). Participants also talked about how hard it is for the
population in general to manage their body weight nowadays. Our increasingly ‘obesogenic’
food environment, which promotes food consumption while discouraging physical activity, is positively associated with the prevalence of obesity (Caballero, 2007; Giskes et al., 2010; Hill & Peters, 1998; Lake & Townshend, 2006).

6.2.2 Pre-study and post-study personal concepts of dietary moderation

Overall, participants’ pre-study concepts and definitions of dietary moderation in relation to added fats, added sugars, and NEEDNT-type foods and beverages, were analogous to those outlined by the New Zealand Food and Nutrition Guidelines for Healthy Adults (MOH, 2003). Participants’ explanations included ‘eating limited amounts of things you know aren’t so good for you’; ‘not eating excess sugar and fat’; ‘eating less saturated fat’; ‘keeping an eye on your portion size’; ‘only having junk food in certain amounts’ and ‘limiting junk foods or snack foods including chocolate, chocolate biscuits, bakery food, chips, and similar types of foods’.

These statements were comparable to the Food and Nutrition Guideline Statements, which recommend consumers to: ‘Prepare foods or choose pre-prepared foods, drinks and snacks; with minimal added fat, especially saturated fat; with little added sugar; limit your intake of high-sugar foods’ (MOH, 2003). In light of this, it seems the key issue is not a lack of understanding, but rather, that the abstractness of moderation messages are inherently prone to misuse or misinterpretation. Hence, a lack of simple, measurable guidance lends itself to dietary excess. This tendency towards overeating may be a consequence of our modern food environment, which normalises oversized portions, particularly in relation to energy-dense, nutrient-poor foods and beverages (Swinburn et al., 2011; Wansink & Van Ittersum, 2007; Young & Nestle, 2003). This idea is demonstrated by the subtle shift in participants’ perceptions of dietary moderation after following the Moderation Guidelines, such as, realising that culturally acceptable portion sizes (for New Zealand) were in fact excessive, and that foods considered categorically ‘healthy’ were not necessarily so. Both USA and Australia provide dietary guidance regarding ‘discretionary’ or ‘empty calories’ (NHMRC, 2013b; USDA, 2011). The Australian recommendations relating to discretionary energy are akin to New Zealand’s
non-specific, non-quantified messages of dietary moderation. Conversely, the USA ‘MyPlate’ model, which incorporates quantified recommendations for intakes of ‘empty calories’, is relatively complex and potentially too difficult for the lay public to use (Willett & Ludwig, 2011; Levine, Abbatangelo-Gray, Mobley, McLaughlin, & Herzog, 2012). Hence, finding the right balance, through recommendations that are neither too vague nor too complicated, was a key focus when developing the NEF system informing preliminary Moderation Guidelines.

6.2.3 NEEDNT Foods Moderation Guidelines and anecdotal weight loss

Owing to the qualitative nature of this pre-test study, and the focus on evaluating subjective process variables (thoughts and perceptions) rather than hard end-points (heights, weights, energy intake, dietary composition), it is not possible to directly compare this study to the quantitative literature reviewed in Chapter 2 (Literature review). However, some interesting, anecdotal comparisons are worth exploration. Five participants self-reported weight losses of between two and four kilograms, solely by reducing their intakes of NEEDNT foods and beverages over 4 weeks. This result is consistent with numerous randomised controlled trials, which all found significant associations between reductions in dietary energy density and weight loss (Ello-Martin et al., 2007; Lapointe et al., 2010; Ledikwe et al., 2007a; Melanson et al., 2012; Raynor et al., 2012a; Raynor et al., 2012b; Rolls et al., 2005a).

6.2.4 Experiences of NEEDNT Foods Moderation Guidelines

For most, the Moderation Guidelines were considered favourably simple and easy to use. These participants interpreted the Moderation Guidelines as permissive and flexible, allowing personal choice within reasonable parameters. Some felt a sense of empowerment and control in weighing up decisions to eat ‘treat’ foods based upon relative NEF values. These participants preferred the Moderation Guidelines’ sole focus on NEEDNT items, which they considered easier than having to account for all foods, as is required for Weight Watchers™ and calorie counting approaches.
For these reasons, many viewed the Moderation Guidelines as a sustainable ‘lifestyle’ approach, rather than a short-term ‘fad’ diet. In the existing literature, ‘simpler’ dietary prescriptions that restrict energy-dense foods are associated with greater weight loss outcomes compared to dietary prescriptions that reduce energy density, total energy, and fat (Raynor et al., 2012a). Furthermore, ‘restrictive’ messages to limit high-fat foods are associated with greater weight loss than ‘non-restrictive’ messages to increase fruit and vegetables (Lapointe et al., 2010). All participants found the Moderation Guidelines increased their knowledge of NEEDNT foods and beverages, and their awareness of portion sizes for both NEEDNT- and non-NEEDNT items. This heightened ‘awareness’ was deemed a principal benefit of the Moderation Guidelines, and for some, this awareness triggered other positive eating and lifestyle changes. Through following the Moderation Guidelines, most participants learned how to distinguish NEEDNT foods and beverages, and gained knowledge regarding the nutritional and caloric characteristics of NEEDNT items. Male participants in particular acknowledged that a previous lack of knowledge about energy-dense foods had hindered prior attempts to lose weight through dietary means. This finding concurs with Morgan et al. (2011) who noted a distinct barrier in men was a lack of knowledge regarding the relationship between energy balance and weight change.

Conversely, a subgroup of participants found the Moderation Guidelines too overwhelming, and ultimately too difficult to apply. Difficulties were attributed to having to remember which foods were classified as NEEDNT (for example, when they didn’t have the Moderation Guidelines print booklet at hand), or in attempting to decipher individual NEEDNT components within mixed, pre-made, or purchased foods. Moreover, some found it too hard to estimate portion sizes and corresponding NEF values. These combined barriers caused some to discontinue following the Moderation Guidelines, partially, intermittently, or entirely. Although the Moderation Guidelines intended to promote a ‘simple’ message, having to monitor fifty NEEDNT food and beverage categories may have hindered participants’ ability
to adopt and implement the Moderation Guidelines. Merriam et al. (2009) hypothesised that focusing on one key dietary goal, such as ‘increasing fibre’, may increase the likelihood of the recommendation being adopted. Similarly, in a randomised controlled trial comparing three energy density based diet prescriptions, Raynor et al. (2012b) reasoned that having too many dietary goals was the reason the ‘Low-Energy-Dense, Low-Energy, Low-Fat’ condition was the least successful in losing weight.

After commencing the Moderation Guidelines, some participants determined that their usual diet was very poor, including a high proportion of NEEDNT foods and beverages. For these people, reducing NEEDNT intakes to the weekly quota of 19 NEFs would have required making considerable dietary changes in a relatively short period of time. Many participants proposed that supplementary support, from a dietitian or GP, would help them learn and build confidence around identifying NEEDNT items and NEEDNT ingredients, estimating portion sizes and NEF values, and adhering to NEF quotas. Furthermore, for those with very poor baseline dietary patterns or skills, tailored input from a dietitian would help them establish regular meal patterns, shopping and cooking skills, and a repertoire of basic recipes, upon which the Moderation Guidelines could then be applied. Relatedly, several participants suggested incrementally reducing their daily and weekly NEF quotas, based upon a baseline assessment of dietary NEEDNT intake. In these instances, the NEEDNT-FFQ, developed and validated by Eder (2014) and Maxwell (2015) respectively, would be a valuable dietary assessment tool during NEEDNT-based dietetic or primary care consultations.

Where some participants found the Moderation Guidelines permissive, others criticised the key messages of the Moderation Guidelines for being framed negatively. While these participants could appreciate the principles and benefits of the Moderation Guidelines in theory, they ultimately found the restrictive nature of the NEEDNT concept unappealing and discouraging. Some participants found the sole focus on NEEDNT foods and beverages to be a major shortcoming of the Moderation Guidelines. These participants wanted information on main
food groups (i.e. standard serving sizes, number of servings per day), energy-balance and total energy requirements, and answers to specific questions (such as how to choose ‘healthier’ bread). Participants acknowledged, however, that comprehensive nutritional information would fundamentally alter the Moderation Guidelines, and detract from the simplicity of the NEEDNT philosophy. Hence, participants again suggested supplementary contact with a dietitian, registered nutritionist, or appropriately trained GP, for tailored and reputable nutritional guidance as needed. Interestingly, the study researcher was asked many questions throughout the project’s duration, in relation to nutrition, specific foods and beverages, name-branded diets, and weight loss (which, for best research practice, were noted and answered after the final data collection interviews). Participants’ queries often indicated non-evidence based and potentially unsafe beliefs about food and nutrition, which likely arose from non-reputable sources (magazines, books, social media, various internet sources, friends and family, and at times, other health professionals without adequate nutrition knowledge). The commonness of this phenomenon among participants further highlights the need for appropriate, on-going dietetic support.

Aside from those who simply found the scope of nutritional information lacking, two participants found the Moderation Guidelines an uninspiring and inadequate resource for weight loss. These participants had a history of extensive weight loss dieting, repeated weight-cycling, and net weight gain over time, relative to other participants. The study researcher noted these participants spoke of historical behaviours characteristic of chronic dieting, chaotic eating, binge eating, or disordered eating patterns, such as constantly being on a diet, ‘yoyoing’, and overeating or bingeing on sugary or fatty foods after a diet ceased or in between diets. Prospective studies have found chronic dieting behaviours are associated with weight-cycling and weight gain (Lowe et al., 2006; Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007). Furthermore, more extreme weight-control behaviours predict outcomes related to obesity and eating disorders (Neumark-Sztainer et al., 2006). For this reason, pre-screening
patients for eating disorder behaviours should be a routine component of NEEDNT-based treatment, using validated tools such as ESP™ and SCOFF™ (NEDC, 2012). Where indicated through pre-screening, referral to appropriate eating disorder support services is warranted, through a GP, specialist eating disorder dietitian, or clinical psychologist. More commonly though, participants identified less severe, ‘non-diagnostic’ eating concerns, including ‘stress eating’, ‘emotional eating’, ‘using food to cope’, or ‘frequently overeating’. In these cases, tailored input from a dietitian is recommended, with referral to a clinical psychologist or counsellor considered on a case-by-case basis.

Some noted that adhering to the Moderation Guidelines was challenging or virtually impossible during social situations, including functions, dinner parties, barbeques, and various cultural celebrations. Difficulties arose from social pressures to overeat, the high availability of NEEDNT foods and beverages, or a lack of non-NEEDNT options. Sometimes, participants simply wanted to ‘let their hair down’ and allow themselves to overeat NEEDNT items in social situations. Furthermore, Māori and Pacific participants emphasised that declining food in social situations was akin to ‘rudeness’, making a restrained approach more difficult to practise.

Overall, the usability and acceptability of the Moderation Guidelines, determined by subjective liking and adherence (both self-reported and researcher-observed), varied greatly among participants. While it is not possible to account precisely for differences in perceived usability and acceptability among individuals, factors relating to human nature, temperament, habits, and personal preferences undoubtedly played a role. For example, some participants strongly favoured the Moderation Guidelines’ ‘minimalist’ approach of not having to account for non-NEEDNT items or main food groups, while others felt perturbed at the absence of broader nutritional information and direction. Where some participants seemed inherently motivated to lose weight and make dietary changes, others were somewhat blasé, or even defeatist, pre-empting ‘failure’ in following the Moderation Guidelines based upon previous unsuccessful weight loss experiences. These observed variances in motivation, intention, and perceived
competence are explained in part by psycho-behavioural concepts, such as readiness to change (Prochaska & Velicer, 1997), self-efficacy (Bandura, 1997), locus of control (Rotter, 1954), self-determination theory, intrinsic versus extrinsic motivation (Ryan & Deci, 2000) and the health action process approach (Schwarzer & Luszczynska, 2008). Most health care professionals are familiar with the ‘Transtheoretical Model’ or ‘Stages of Change’, a model that conceptualises the process of intentional behaviour change through six stages of readiness: Precontemplation (not ready), Contemplation (getting ready), Preparation (ready), Action, Relapse, and Maintenance (Prochaska, DiClemente, & Norcross, 1992; Prochaska & Velicer, 1997). Participants who were successful in implementing the Moderation Guidelines may have been at the Contemplation, Preparation, or Action stages, while those who made half-hearted attempts were more likely in the Precontemplation stage. Relatedly, self-efficacy refers to a person’s belief in their capacity to carry out the behaviours necessary to produce a specified result (Bandura, 1997). Dennis and Goldberg (1996) suggest that tailoring weight loss programmes to match clients’ intrinsic needs may strengthen overall self-efficacy and promote weight loss. Similarly, appropriate dietetic support, including evidence-based motivational counselling strategies, is shown to enhance self-efficacy in certain individuals (PEN, 2012).

6.2.5 Presentation and design of the print booklet

Participants unanimously requested re-categorisation of NEEDNT foods and beverages into more consumer-friendly groupings. For many, adherence was diminished by difficulties encountered in locating specific NEEDNT items within the print booklet. Conducting focus groups with representative users could facilitate user-led improvements in categorisation and nomenclature. A one-page ‘cheat sheet’ version of the Moderation Guidelines (as was resourcefully created by one participant) could also enhance usability and adherence. Better yet, the development of the Moderation Guidelines into a smartphone app and website would automatically resolve categorisation and terminology issues, through improved ‘search and find’ functionality, and a database of synonyms for similar NEEDNT foods and beverages (for
example, ‘sausage’, ‘frankfurter’, ‘saveloy’, ‘chipolata’, ‘cocktail sausage’, or ‘polony’). Participants felt strongly that an app would improve convenience, appeal, usability, and adherence. To maximise the impact of revised print and digital formats, formal input from design professionals, nutrition education specialists, and of course, potential end-users, are all highly advisable.

6.2.6 Cultural considerations

The study group included one Tongan Pacific Islander and two New Zealand Māori participants. These participants voiced the importance of using culturally appropriate language when communicating nutrition and health messages to those identifying as Māori or Pasifika. For instance, participants strongly discouraged the use of words such as “diet”, “overweight”, “obese” or “obesity”, and instead advised discussing weight management within the greater context of “health”, “wellness”, “family”, “whānau”, “community”, “spirituality”, “marae” and “church”. Māori and Pacific participants suggested approaching church communities and marae to promote the Moderation Guidelines to groups rather than individuals. These suggestions are congruent with Durie (as cited in Rochford, 2004) ‘Te Whare Tapa Whā’, the Māori model of health, which incorporates the four cornerstones of whānau (family), tinana (physical health), hinengaro (mental health), and wairua (spiritual health). Similarly, the ‘Fonofale’ Pasifika model of health comprises four interrelated dimensions of spiritual, physical, mental, and ‘other’, within the metaphor of a house (MOH, 2008). The Moderation Guidelines could certainly be adapted to embrace multidimensional aspects of health, and to incorporate traditional foods and culturally tailored terminology. It is essential this process be carried out in consultation and collaboration with Māori and Pacific groups, representatives, and stakeholders.
6.3 Strengths and limitations of the study

The present study represents original and highly topical research. NEEDNT Foods Moderation Guidelines are the first New Zealand-based nutrition education resource to provide quantified intake guidelines regarding a class of energy-dense, nutrient-poor foods. The Moderation Guidelines incorporate evidenced-based recommendations from the Australian and USA Dietary Guidelines regarding ‘discretionary’ or ‘empty calorie’ allowances (NHMRC, 2013b; USDA, 2011).

According to this thesis author’s extensive research, there is a very limited body of research pertaining specifically to participant-led evaluations of nutrition education materials or programmes designed for weight loss. Hence, the key findings of this empirical research, as well as the methodological processes used, may inform future, user-led exploratory studies. The use of qualitative methods of inquiry allowed for a level of in-depth data that could not have been achieved by quantitative methods. However, there are notable limitations regarding the study sample and the generalisability of key findings. The sample population was limited to staff and students from the University of Otago and Otago Polytechnic. As such, participants are not representative of all obese persons throughout New Zealand, and the findings from this study cannot be extrapolated beyond highly similar obese groups. Nevertheless, the findings may stimulate reflection regarding the use, appropriateness, or adaptation of the Moderation Guidelines for subsets of obese persons, including the food-insecure, minority ethnic groups, and those with disabilities, mental-health issues, co-morbidities, or contraindicated conditions. Finally, involving key stakeholders in future NEEDNT-based research, such as dietitians, GPs, health and obesity bodies, and cultural representatives, may enhance the overall quality of research by aligning with best practice principles in nutrition education.
6.4 Implications for future research

The impetus for this empirical research was premised on an inherent need for simple, unambiguous guidance for moderating dietary intakes of non-essential food groups, and, a desire to contribute to the field of qualitative nutrition research, through user-led evaluations of such a resource.

We already know from the body of quantitative literature that energy-dense, nutrient-poor foods and beverages are associated with obesity (Ello-Martin et al., 2007; Lapointe et al., 2010; Ledikwe et al., 2007a; Melanson et al., 2012; Raynor et al., 2012a; Raynor et al., 2012b; Rolls et al., 2005a). The next challenges relate to the application of these messages. How can we best convey key nutrition messages regarding energy-dense, nutrient-poor foods? How do we get people to adhere to such messages? How can we improve the way in which we provide nutrition guidance, from the end-users’ point of view? Qualitative research in nutrition can help us explore and understand these questions. The present study sought to construct a simple resource for identifying and moderating a class of energy-dense, nutrient-poor foods and beverages, and to explore issues relating to the usability and acceptability of such a resource, from the participants’ perspective.

The findings of the present study suggest several areas for future research, involving the NEEDNT Food List™, NEEDNT-FFQ, and NEEDNT Foods Moderation Guidelines. First and foremost, the next step is to make modifications and enhancements to preliminary Moderation Guidelines, based upon key findings outlined in Chapter 5 (Findings). The participant feedback gained provides a basis upon which to plan and implement specific resource development processes, such as needs assessments, focus groups, terminology/language testing, incorporation of design principles, and the application of behavioural change theories and best-practice principles in nutrition education. After adequate revisions, retesting, and finalisation of the Moderation Guidelines, the next logical step would be an intervention trial, to
quantitatively assess the efficacy of the Moderation Guidelines in relation to weight loss and dietary quality in obese persons. A suggested project outline and pre-obtained ethical approval are available in relation to this potential study (Appendices B & L; pages 183 & 211). Other research arms could include a feasibility study to assess the NEEDNT concept as part of a public health campaign, similar to the Australia-based LiveLighter campaign (Government of Western Australia Department of Health, 2015). Similarly, focus group research may facilitate the development of culture-specific versions and/or community-based adaptations of the Moderation Guidelines. Finally, the development and pre-testing of a NEEDNT-based app and website would align the Moderation Guidelines with our technology-oriented culture. The development of an app, website, and public health campaign should be conducted in conjunction with the above-mentioned Moderation Guidelines development process, to allow for cohesion across various NEEDNT products, and a robust NEEDNT brand.

6.5 Study conclusion

Traditionally, research in Human Nutrition and Dietetics has been dominated by quantitative methodologies, through survey, correlational, and experimental studies. Collectively, these studies have been instrumental in understanding the components of nutritional science, in relation to health promotion and disease prevention. Here in New Zealand, as in other developed countries, the rising prevalence of obesity has spurred a great deal of research into the biological, behavioural, and environmental factors associated with overweight and obesity (MOH, 2015; OECD, 2014; WHO, 2015c). Research indicates that dietary patterns characterised by energy-dense, nutrient-poor foods are positively associated with energy intake, BMI, and obesity (Nesheim & Nestle, 2012; Ello-Martin et al., 2007; Lapointe et al., 2010; Ledikwe et al., 2007a; Melanson et al., 2012; Raynor et al., 2012a; Raynor et al., 2012b; Rolls et al., 2005a). Furthermore, in our modern food environment, these ‘empty calories’ are inexpensive and widely available (Caballero, 2007; Giskes, van Lenthe, Avendano-Pabon, & Brug, 2011; Lake & Townshend, 2006; Swinburn, Egger, & Raza, 1999). Research suggests
highly palatable, energy-dense foods may challenge our natural appetite control systems, further encouraging their consumption (Gearhardt, Davis, Kuschner, & Brownell, 2011; Kessler, 2009).

In this descriptive, qualitative study, the majority of participants considered the Moderation Guidelines to be an appealing and usable dietary resource for identifying and moderating NEEDNT foods and beverages. A small minority found the Moderation Guidelines fundamentally unappealing, or too complex, and struggled with adherence. This latter subset tended to have histories of extensive dieting, weight-cycling, poor baseline eating habits, or concomitant life stressors. For such clients, on-going dietetic support is strongly recommended, with an emphasis on motivational counselling techniques, and individually tailored nutritional education. Pre-screening of clients is advised, to assess the suitability of the Moderation Guidelines on a case-by-case basis. Key factors associated with overall usability and acceptability of the Moderation Guidelines included: the individual’s views and partiality to the NEEDNT-based approach and philosophy; the presentation and design of the Moderation Guidelines booklet; habitual eating patterns; and behavioural aspects including readiness to change and self-efficacy. Based on the encouraging findings of this study, further research is warranted following the development and retesting of the Moderation Guidelines, including an intervention trial to investigate the effect of the Moderation Guidelines on weight loss and dietary quality in obesity; the development of app and website formats; the feasibility of NEEDNT-based public health campaigns; and culture-specific adaptations of the Moderation Guidelines for Māori and Pacific people.
7 Application to dietetic practice

7.1 NEEDNT Foods Moderation Guidelines

This research will help inform future dietetic practice by providing dietitians with a simple dietary resource for working with obese patients. Dietitians often encounter patients with dietary patterns characterised by excessive amounts of energy-dense, nutrient-poor foods (J. L. Elmslie, personal communication, 1 February, 2012; Nesheim & Nestle, 2012). It is relatively straightforward to communicate messages about main foods groups, by referring to recommended daily servings and examples of standard serving sizes. However, it becomes more complex to provide guidance regarding foods and beverages to ‘limit’ or ‘moderate’, and to convey what ‘less’ actually means. Hence, NEEDNT Foods Moderation Guidelines were devised to assist patients in distinguishing and moderating intakes of NEEDNT foods and beverages. ‘NEEDNT’, an acronym for ‘non-essential, energy-dense, nutritionally-deficient’, includes foods and beverages usually high in energy and lacking in nutritional benefits, or easily replaced with lower energy, more nutritious alternatives. While some people are able to inherently moderate their intakes of energy-dense, nutrient-poor foods, others need clear, quantified guidance in order to reduce these foods to an extent sufficient to create an energy deficit (Gearhardt et al., 2011; Kessler, 2009; Liu, von Deneen, Kobeissy, & Gold, 2010). Whilst consumers can make educated food decisions by referring to nutrition labelling, including NIPs and ingredient lists, in reality it can be difficult to instruct patients to interpret nutritional labelling when it is provided alongside misleading nutrition claims, branding and marketing, and other endorsements (Lobstein, 2009; Gorton, 2007). The Moderation Guidelines provide a mechanism for easily identifying energy-dense, nutrient-poor choices, and quantified guidance for moderating their consumption. The Moderation Guidelines use a basic exchange system, assigning ‘non-essential food’ values, or NEFs, where 1 NEF is equal to approximately 418 kJ (or 100 kcal) of a specified NEEDNT food or beverage portion. The Moderation
Guidelines allow up to 19 NEFs per week, equating to 7950 kJ (1900 kcal) or ≤15% of the estimated energy requirements for adult New Zealanders, based upon an average daily intake of 8700 kJ (~2000 kcal) (FSANZ, n.d.). A more complete rationale and background for the NEEDNT Food List™ is outlined in the original publication (Elmslie et al., 2012), and details regarding recommendations for further development of the Moderation Guidelines are outlined within this thesis.

7.2 NEEDNT Foods Moderation Guidelines and the Nutrition Care Process

The Moderation Guidelines can be incorporated into standard dietetic consultations and the existing Nutrition Care Process (NCP). During Step 1: Nutrition Assessment, the NEEDNT-FFQ (Eder, 2014; Maxwell, 2015) can be used alongside a traditional diet history. The Moderation Guidelines are contraindicated for those at risk of eating disorders; hence, pre-screening with ESP™ and/or SCOFF™ is advised (NEDC, 2012). In Step 2: Nutrition Diagnosis, examples of relevant diagnostic classes or ‘problems’ include those pertaining preferentially to ‘Intake (NI) Problems’, such as: Excessive energy intake (NI-1.3), Excessive oral intake (NI-2.2), Excessive fat intake (NI-5.6.2), Intake of types of fats inconsistent with needs (e.g. saturated fats) (NI-5.6.3), or Intake of types of carbohydrate inconsistent with needs (e.g. sucrose) (NI-5.8.3); or secondly to ‘Clinical (NC) Problems’, such as: Overweight/obesity (NC-3.3), or Unintended weight gain (NC-3.4); or thirdly to ‘Behavioural-Environmental (NB) Problems’, such as: Food- and nutrition-related knowledge deficit (NB-1.1), Limited adherence to nutrition-related recommendations (NB-1.6), or Undesirable food choices (NB-1.7). In Step 3: Nutrition Intervention, the Moderation Guidelines can be used as a stand-alone nutrition education resource together with dietetic counselling (PEN, 2012) or in conjunction with traditional resources, such as the ‘Eating for Healthy Adults’ booklet (MOH, 2013). For Step 4: Nutrition Monitoring and Evaluation, dietitians and patients can monitor NEEDNT intakes, based on recommended NEF quotas, or individualised NEF goals. At follow-up consultations,
the Moderation Guidelines will be a valuable tool for revealing gaps in a patient’s knowledge and skills, thus allowing for tailored dietetic input or referral to other health care providers.

7.3 Summary of application to practice

In summary, NEEDNT Foods Moderation Guidelines are a unique resource, providing quantified guidance for implementing the concept of dietary moderation, which may appeal to many obese individuals who want to lose weight by moderating NEEDNT food and beverage intake. The Moderation Guidelines will likely be a valuable addition to dietitians’ compendium of resources for weight management.


Brownell, K. D. (2010). The humbling experience of treating obesity: should we persist or desist? *Behaviour Research and Therapy, 48*(8), 717-719. [http://dx.doi.org/10.1016/j.brat.2010.05.018](http://dx.doi.org/10.1016/j.brat.2010.05.018)


Côté, L., & Turgeon, J. (2005). Appraising qualitative research articles in medicine and medical education. *Medical Teacher, 27*(1), 71-75. [http://dx.doi.org/10.1080/01421590400016308](http://dx.doi.org/10.1080/01421590400016308)


Drewnowski, A. (2000). Nutrition transition and global dietary trends. *Nutrition*, 16(7), 486-487. [http://dx.doi.org/10.1016/S0899-9007(00)00295-1](http://dx.doi.org/10.1016/S0899-9007(00)00295-1)

Drewnowski, A. (2003). The role of energy density. *Lipids*, 38(2), 109-115. [http://dx.doi.org/10.1016/s0899-9007(00)00295-1](http://dx.doi.org/10.1016/s0899-9007(00)00295-1)


http://dx.doi.org/10.1016/s0002-8223(99)00018-8


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http://dx.doi.org/10.1006/pmed.1999.0585

http://dx.doi.org/10.1016/j.disamonth.2005.08.002

http://dx.doi.org/10.1177/1098214005283748

http://dx.doi.org/10.3945/ajcn.2010.28450f


http://dx.doi.org/10.7326/0003-4819-142-1-200501040-00012


Wills, W. J., Dickinson, A. M., Short, F., & Comrie, F. (2013). What is being conveyed to health professionals and consumers through web and print sources of nutrition information? *Catalan Journal of Communication and Cultural Studies, 5*(2), 221-240. http://dx.doi.org/10.1386/cjcs.5.2.221_1


Appendix A: Ethics application

NATIONAL APPLICATION FORM FOR ETHICAL APPROVAL OF A RESEARCH PROJECT

NAF-2009-v1

The application guidelines (NAFG-2009-v1) are to be read before completing this form to ensure that the questions are answered appropriately.

The electronic version of this form is formatted the same way as the paper version so that, for example, where an answer needs six lines, six lines are formatted, but where an answer only needs one line, one line is formatted. Please note the number of lines allowed for a question before answering it and make sure that you do not use extra lines.

You may find it helpful to print out the application form before completing it to help you to keep to the page limits allowed. No extra pages should be added, except where specified, as appendices.

The relevant paragraphs of the Operational Standard for Ethics Committees (Ministry of Health document) have been included in subject headings for reference.

The page breaks are not to be deleted as this will affect the formatting of the form.

When collating your application, please ensure that the information sheet, consent form and any attachments are placed behind the application form before copying. Applications not correctly collated, ie not in complete sets ready to be sent to committee members will be returned.

Do not include this page with your application.
# Checklist for Applicants – attach to front of application

Before sending your application form, please check to make sure that all relevant information has been attached. If not applicable to the application write N/A. Protocols, information sheets, consent forms, questionnaires, advertisements, letters of invitation, data collection or other study forms must have a version number and date (marked *). Please note: Incomplete applications will not be considered. Pending is an option only for written confirmation of Māori consultation, SCOTT approval, and Locality assessment by organisation. For multi-region studies, the documentation for one site must be complete.

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<td>*Study protocol – must be supplied with all applications</td>
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<td>Page 21 of NAFG, QE on NAF</td>
<td>*Consent form</td>
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<td>Evidence of Māori consultation</td>
<td>Yes</td>
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<td>Part 4 of NAF</td>
<td>Declaration signed by principal investigator, Head of Department or Dean (for each site)</td>
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<td>Part 4, Form A or B of NAF</td>
<td>Accident compensation declaration correctly witnessed</td>
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<td>NAFG pages 30-32</td>
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NATIONAL APPLICATION FORM FOR ETHICAL APPROVAL OF A RESEARCH PROJECT

Part 1: Basic Information

1. Full project title (include protocol number if applicable)
   - Development and Pilot Evaluation of NEEDNT Foods List Moderation Guidelines

2. Short project title (lay title)
   - The 'NEEDNT Foods' Moderation Guidelines Pilot Study

3. Principal investigator's name and position
   - Dr Jane Elmslie, Research Fellow, Department of Psychological Medicine, Christchurch

4. Contact address of principal investigator
   - National Addiction Centre
   - Department of Psychological Medicine
   - University of Otago, Christchurch
   - Box 4345, Christchurch Mail Centre 8140
   - Work phone no. 03 364 0480
   - Emergency no.* 027 646 0098
   - Fax 03 364 1225
   - Email jane.elmslie@otago.ac.nz

5. Principal investigator's qualifications and experience in the past five years (relevant to proposed research)
6. Co-investigator’s name(s), qualifications and position(s) and, if more than one locality; principal investigator at each locality

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<td>Renée Graham, BSc, MDiv Student (student researcher for interim pretest phase)</td>
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7.1 Address of A above

| National Addiction Centre | Work phone no. | 03 364 0480 |
| Department of Psychological Medicine | Emergency no.* | 027 201 7152 |
| University of Otago, Christchurch | Fax | 03 364 1225 |
| Box 4345, Christchurch Mail Centre 8140 | Email | ria.schroder@otago.ac.nz |

7.2 Address of B above

| Department of Human Nutrition | Work phone no. | 03 479 7959 |
| University of Otago | Emergency no.* | 027 363 3977 |
| PO Box 56 | Fax | 03 479 7958 |
| Dunedin 9054 | Email | grare630@student.otago.ac.nz |

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(* option for ethics committee’s information only)

8. Where this is supervised work

8.1 Supervisor’s name

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<th>03 364 0480</th>
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8.2 Signature of supervisor (where relevant)

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9. List locality organisation(s) involved, including contact address, and complete the locality assessment in Part 4: Declarations (refer to the Guidelines (NAFG-2009-v1))

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10. I wish the protocol to be heard in a closed meeting.  
   □ Yes  □ No

   If the answer is yes, please provide a reason why you wish the protocol to be heard in a closed meeting in accordance with the Official Information Act 1982.

11. If the study is based, in part or in full, overseas, which countries are involved?  
   Not Applicable

12. Has this application been reviewed by another ethics committee in New Zealand or overseas?  
   □ Yes  □ No

   (If yes, advise which country, the name of the committee(s) and the decision(s) of the committee(s))

   Please note a copy of the report(s) may be requested.

   Not Applicable

13. Human tissue – Does the project involve collection or use of human tissue?  If yes, complete Part 5.  
   □ Yes  □ No

14. Gene studies – Does this research involve any gene or genetic studies?  
   If yes, complete Part 6.

   □ Yes  □ No

15. Xenotransplantation – Does this research involve the transplantation of living biological material from one species to another?  
   If yes, complete Part 7.

   □ Yes  □ No

16. Consent – Are all participants able to provide consent for themselves?  
   If no, complete Part 8.

   □ Yes  □ No
17. **Lay summary** – give a brief lay (non-technical) summary of the study (not more than 200 words) such as you would give as an explanation to participants.

People become obese by eating more calories/kilojoules (‘food energy’) than they need; however, current lifestyle treatment for obesity is relatively ineffective for permanent weight loss. One reason for this is that excessive consumption of foods high in calories from fat, sugar or alcohol and low in essential nutrients; ‘non-essential, energy dense, nutritionally deficient’ (NEEDNT) foods may undermine people’s efforts to lose weight. Furthermore, there is increasing evidence to suggest that many NEEDNT foods may be addictive. Although health professionals/agencies promote the concept of ‘moderation’ and ‘eating a balanced diet’ to achieve a healthy weight, these concepts are poorly defined and understood and open to subjective interpretation. Therefore, the provision of clear, simple guidelines, with serving sizes and amounts, may assist obese people to regulate their intakes of NEEDNT foods. Fifty people, with a BMI ≥30 and at least 1 previous unsuccessful weight loss attempt, will follow specific moderation guidelines for the consumption of 50 NEEDNT foods, for a 12-week period. Key outcomes will be: changes in dietary intake, NEEDNT foods intake, body weight, waist circumference, and weight- and eating-related psychological outcomes. Measurements will be taken before the intervention starts and upon completion of the intervention.

18. **Proposed starting date (dd/mm/yy)**
   - TBA (expected to start 2013 or 2014)

19. **Proposed finishing date (dd/mm/yy)**
   - TBA

20. **Duration of project in New Zealand (mm/yy)**
   - 12 months

21. **Proposed final report date (mm/yy)**
   - TBA

22. **Has the clinical trial been registered?**
   - Yes [ ] No [x]

   **If yes, name the register.**
   - Not Applicable

   **If no, has registration been applied for?**
   - Yes [ ] No [x]

   **Comment:** The project has not been registered as a clinical trial as it is a student project and a pilot study.
Part 2: Ethical Principles

A. Validity of research  
(Operational standard paragraphs 53–59)

SCIENTIFIC BASIS

A1. Aims of the project

A1.1 What is the hypothesis/research question(s) and/or the specific aims of the project? (State briefly.)

**Comment:**

Primary Questions

1. Do specific moderation guidelines for consumption of NEEDNT* foods result in healthier eating, lower body weight and decreased waist circumference?

2. Do specific moderation guidelines for consumption of NEEDNT* foods improve or worsen weight and eating-related psychological measures such as eating attitudes and behaviours?

3. Is the severity of compulsive eating at baseline associated with treatment outcomes (dietary intake, body weight, and waist circumference) in participants using the NEEDNT* Foods List Moderation Guidelines?

Secondary Questions

4. How easy/difficult to use are specific moderation guidelines for NEEDNT foods?

*NEEDNT is an acronym for ‘non-essential, energy-dense, nutritionally-deficient’ as explained in earlier questions.

Key background publication:


A2. Scientific background of the research

A2.1 Has this project been scientifically assessed by independent review?  
[ ] Yes [ ] No

If **yes**, describe the process, for example, HRC funding assessment process. *A copy of the report should also be attached. The researcher’s response may also be included.*

The project has not been scientifically assessed by an independent body such as HRC because it is a student project and a pilot study.

If **no**, do you intend to have the project scientifically assessed and by whom?  

[ ] Associate Professor Chris Frampton (Biostatistician) has scientifically assessed the project and advised that the study design is suitable for the questions posed.
A2.2 Describe the scientific basis of the project (300 words maximum). Where this space is inadequate, continue on a separate sheet of paper. Do not delete page breaks or renumber pages.

Obesity rates in New Zealand are on the rise. Data from the Adult Nutrition Survey (Ministry of Health, 2008/09) found the prevalence of obesity in New Zealand to be 27.7% in males and 27.8% in females. Obesity is associated with cardiovascular disease, various types of cancer, type 2 diabetes, osteoarthritis, sleep apnoea, as well as psychological and social problems. Weight-loss is achieved by creating a negative energy-balance; that is, reducing dietary energy intake while increasing energy-expenditure through activity. Despite this apparent simplicity, success rates in treating obesity long-term are poor. Clinicians often educate obese patients in energy-balance by way of advising 'moderation' through reducing high-fat and/or high-sugar foods or reducing calories; sensible concepts which are espoused within the Food and Nutrition Guidelines for Healthy Adults (Ministry of Health, 2003). However, this advice is often ambiguous and difficult to apply within a food culture dominated by energy-dense, highly palatable, convenience foods. Furthermore, evidence suggests an addictive component to these energy-dense, high-fat, high-sugar foods, leading to habitual overeating and obesity (Gilhooly et al, 2007).

Individuals can of course utilize nutrition information panels (NIP) to make better food choices, but interpreting these mandatory labels requires a high level of motivation and nutritional-literacy not often possessed by the lay public (Gorton et al, 2009). Conversely, simplified systems such as ‘traffic light’ labelling are easier to understand and can improve consumers food choices, but are unfortunately voluntary in New Zealand at present. So in the absence of effective public health interventions, obesity needs to be tackled at the individual level. The development of specific moderation guidelines for the consumption of non-essential, energy-dense, nutritionally-deficient foods (NEEDNT foods) will provide a bridge between poorly defined moderation advice and overly complex nutrition labelling, and may be a useful tool for health professionals working with people wanting to lose weight.

A3. Study design

A3.1 Describe the study design. Where this space is inadequate, continue on a separate sheet of paper. Do not delete page breaks or renumber pages.

**Design:** Develop and pilot test moderation guidelines for consumption of foods on the NEEDNT foods list and evaluate prospectively, using a pre-test, post-test study design. **Subjects:** 50 people, aged 18-65 years, with BMI ≥30 and ≥1 previous unsuccessful weight-loss attempt, recruited by public advertisement; excluding those with weight loss of ≥5% in the last 6 months, taking insulin, steroids, atypical antipsychotic medications, or weight-loss medications, pregnant or intending to become pregnant in the next 12 weeks, past or current history with Anorexia or Bulimia Nervosa, or severe physical illness that would prevent them participating in the study. Potential participants will be screened by telephone interview and undergo informed consent prior to acceptance. **Baseline Assessments:** Anthropometric - height, weight, BMI, waist circumference; Dietary - 7-day food record [Appendix VII]; Psychological/Behavioural Assessments - Temperament and Character Inventory (TCI) [Appendix VI]; Eating Compulsivity (currently in development by Dr Ria Schroder), Three-Factor Eating Questionnaire [Appendix X], Eating Disorders Examination Questionnaire [Appendix IX], and Dutch Eating Behaviour Questionnaire [Appendix VIII]. **Weeks 4 and 8 Assessments:** Anthropometric - weight. **Week 12 Assessments:** Repeat of all baseline measurements, excluding TCI and including an additional participant questionnaire.

A4. Participants

A4.1 How many participants do you intend to recruit? (Include details for each locality organisation.)

50 people with obesity will be recruited in the Dunedin region over a 6-8 week period through advertisements in local media including the Otago Daily Times and community newspapers.
A4.2 Give a justification for the number of research participants proposed, giving the details of power calculations when appropriate.

Associate Professor Chris Frampton (Biostatistician) has reviewed the study design and has indicated that the intended number of participants is adequate for the proposed pilot study. He commented that the study will yield valuable information about the methodology and numbers of participants needed for a subsequent randomised controlled trial, comparing the NEEDNT Food List Moderation Guidelines with other treatment modalities.

A4.3 If randomisation is used, explain how this will be done.

No randomisation will be used, as all 50 participants will be assigned to the same intervention. The study is a pre-test, post-test design, with participants as their own controls.

A5. Statistical method

A5.1 Is the method of analysis quantitative? ☒ Yes ☐ No

Or qualitative? ☒ Yes ☐ No

If the method of analysis is wholly qualitative, go to question A5.4.

If the method of analysis is wholly or partly quantitative, complete the following:

A5.2 Describe the statistical method that will be used to analyse the data.

Changes in dietary intake (energy, % energy from macronutrients, alcohol and sucrose), NEEDNT foods intake, bodyweight, and waist circumference, Eating Compulsivity, TFEQ and EDE-Q/DEBQ will be assessed by repeated measures ANOVA.

A5.3 Has specialist statistical advice been obtained about this study? ☒ Yes ☐ No

If yes, from whom? (A brief statistical report should be included if appropriate.)

Associate Professor Chris Frampton
A5.4 If the method of analysis is wholly or partly qualitative, specify the method. Why is this method appropriate? If interviews are to be used, include the general areas around which they will be based and a copy of the interview guide, if one is to be used. Copies of any questionnaires that will be used must be included.

Not Applicable

A6. Expected outcomes or impacts of research

A6.1 What is the potential significance of this project for improved health outcomes?

This study has the potential to increase the success of current lifestyle treatment for obesity. If these moderation guidelines are proven effective, they will improve the consistency of information given to people with obesity concerning how often and how much of these foods should be eaten. In the long-term this would be expected to reduce rates of obesity-related co-morbidities. There are 13 population health objectives of the current New Zealand Health Strategy. Five of these will be potentially affected by this study. This study has considerable potential to change the way in which obese people are managed and may consequently lead to better long-term health outcomes for obese people.

A6.2 What is the potential significance of this project for the advancement of knowledge?

This project will investigate whether moderation guidelines are an effective tool to assist in obesity management. At present there are no specific ‘moderation’ guidelines available for patients or clinicians. The project will investigate whether and/or how these guidelines affect energy intake, diet quality, psychological wellbeing, and weight- and eating-related cognitions. To date, papers concerning these specific issues have not been published in the obesity literature.

A6.3 What steps will be taken to disseminate the research results?

Formal dissemination will be by way of peer-reviewed articles in leading international journals in obesity. Opportunities to make oral presentations to local, national and international audiences will be actively pursued. Dr Elmslie is involved with a number of obesity, diabetes and nutrition organisations through which the results of the study will also be disseminated (DNZ, ANZOS, NZSSD, NSNZ, Diabetes NZ, NZNF, and ANA. Dr Elmslie and Schroder will also actively disseminate findings through their work at the National Addiction Centre and affiliated organisations including www.addiction.org.nz. Finally, media interest in the study will be fostered and facilitated through the University of Otago Communications Managers in Dunedin and Christchurch.
### A7. Publication of results

Will any restriction be placed on publication of results?  

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<th>Yes</th>
<th>No</th>
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If yes, please supply details.  

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<th>Not Applicable</th>
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### A8. Funding

**A8.1 How will the project be funded?**

As this is a student project, a limited amount of funding will be available from funds allocated for Masters projects undertaken in the Department of Human Nutrition, University of Otago. It is not proposed to seek further funding at this stage.

### A8.2 Does the researcher, the host department, the host institution or the locality organisation have any conflict of interest, e.g. financial interest, in the outcome of this research?  

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<th>Yes</th>
<th>No</th>
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If yes, please give details.

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<th>Not Applicable</th>
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### A9. Incentive payments

**A9.1 Have you read and understood the description of incentive payments in the Guidelines?**

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<th>Yes</th>
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Note: Details about any payment (in money or kind) or reward made to participants recruited into the project are to be provided in question E10.

**A9.2 Does the funding available to the project depend upon the number of participants recruited, e.g., is the funding on a per participant basis?**  

If yes, give details of the amount per participant. Where there is a significant difference between these, this incentive to recruit should be declared in the information sheet.

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<th>Yes</th>
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<th>Not Applicable</th>
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A9.3 Does the funding available to the project include any form of incentive (in money or kind) for the early or complete recruitment of a specified number of participants, e.g., bonus payments to the researcher, host department or host institution? If yes, give details.

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<th>Yes</th>
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Not Applicable

A9.4 Will all funding available to the project be passed through an audited research account or cost centre? If yes, give details. If no, specify why not.

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<th>Yes</th>
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No funding being sought.

### B. Minimisation of harm

(Operational standard paragraphs 60–68)

**B1.** How many visits/admissions of participants will this study involve? Clarify what is in addition to standard treatment. Give also an estimate of total time involved for participants.

Persons who respond to the recruitment advertisements will be contacted by telephone by the student researcher (TBA) and screened for suitability. For each participant accepted following screening, the project will involve 4 visits to the Department of Human Nutrition, University of Otago, Dunedin (1 baseline visit, 1 visit at each of weeks 4 and 8, and a final visit at week 12). Baseline and week 12 visits will be of longer duration, as most/all outcome measures will be assessed at these times. Additionally, an education session will be given at the baseline visit to teach participants how to use and follow the moderation guidelines. Participants may also contact the student researcher (TBA) by email or telephone during the 12-week period if they have queries regarding the study or the moderation guidelines. Taking all of this into account, we estimate that the total time involved will be up to 25 hours per participant, including completion of questionnaires and dietary records at home, but excluding travel time for visits.

**B2.** Who will carry out the research procedures?

The student researcher (TBA) will carry out all anthropometric and dietary assessments and administer questionnaires.

**B3.** What other research studies is the lead investigator currently involved with?

Dr Elmslie is currently involved in a study examining Abstinence in the Treatment of Obesity. Her role in this project to date has involved contributions to the study design and application for funding and providing dietary advice to the other investigators and the study participants as required. As an investigator on this project she will also be involved in data analysis and write-up for publication. The NEEDNT Food List is being used in this study.
B4. Where will the research procedures take place?

Research procedures and assessments will take place in the Department of Human Nutrition, University of Otago, Dunedin.

B5. How do the research procedures differ from standard treatment procedures?

Currently, people with obesity are not given specific guidelines for moderating their intakes of NEEDNT foods. In addition, most people with obesity do not receive feedback on their dietary intakes that is informed by nutrient analysis, as they will in this study. Lastly, psychological measures are not usually part of usual care for persons receiving obesity treatment.

B6. What are the benefits to research participants of taking part in the project?

Participants may achieve weight-loss by following moderation guidelines for NEEDNT foods, which may help to prevent obesity-related comorbidities, and enhance their overall health and wellbeing. Participants will receive a comprehensive dietary assessment, informed by computerised nutrient analysis. This may help them to better understand the connection between their eating and their obesity. Participants may also gain insight into psychological/emotional factors affecting their food intake and weight, which may enhance their ability to achieve and maintain a healthy weight over the long-term.

B7. Describe any methods for obtaining information. Attach questionnaires and interview guidelines. (If National Health Index (NHI) information is used, see the Guidelines (NAFG-2009-v1).)

A Telephone Screening Form [Appendix III] will be used to identify suitable persons who respond to newspaper advertising [Appendix II] for the study. An Information Sheet [Appendix V] will be provided along with a Consent Form [Appendix IV]. Questionnaires provided will be the Temperament and Character Inventory [Appendix VI], Eating Compulsivity Assessment (currently in development by Dr Ria Schroder), Eating Disorder Examination Questionnaire [Appendix IX] and Dutch Eating Behaviour Questionnaire [Appendix VIII]. Dietary assessment will be carried out by way of Food Records produced by the University of Otago Human Nutrition Department [Appendix VII]. Data from these food records, as well as follow-up verbal questions about portions sizes, brands, cooking methods etcetera, will be analysed using Diet Cruncher Diet Analysis Nutrition Software (Way Down South Software, Version 1.2.0, 2004). An additional brief participant questionnaire [Appendix XI] will be administered at week-12.

B8. Briefly describe the inclusion/exclusion criteria and include the relevant page number(s) of the protocol or investigator’s brochure.

Inclusion Criteria: Aged 18-65 years, BMI ≥30, ≥1 previous unsuccessful weight-loss attempt.

Exclusion Criteria: Weight loss of ≥5% in the last 6 months, taking insulin, steroids, atypical antipsychotic medications, or weight-loss medications, pregnant or intending to become pregnant in the next 12-weeks, past or current history of Anorexia or Bulimia Nervosa, serious physical illness; sufficient to affect participation in the study.

B9. What are the physical or psychological risks or side effects to participants or third parties? Describe what action will be taken to minimise any such risks or side effects.

The risks of being in this study are minimal. Misinterpretation of the moderation guidelines could potentially result in transient over-restriction of calories. However this risk will be minimised by encouraging study participants to maintain close contact with the researcher and enabling them to feel comfortable asking any questions they may have.
B10. What facilities/procedures and personnel are there for dealing with emergencies?

We do not envisage that any onsite emergencies will arise as a result of participation in this study. However, the Principal Investigator is a Registered Dietitian and will be available for consultation and intervention should any emergencies arise. Additionally, one collaborator is a final year Student Dietitian who has access to support from tutors who are Registered Dietitians. The patient’s GP will retain overall responsibility for their healthcare and participants will be advised to consult him/her about any medical issues that arise during the study. The research team will work collaboratively with the GP to deal with any medical issues that are related to aspects of the study.

B11. What arrangements will be made for monitoring and detecting adverse outcomes?

Upon completion of telephone screening, participants will be advised that should they experience any adverse effects from participating in the research, they are to contact the student researcher (TBA) immediately and their concerns will be addressed. Further, if the study researcher thinks the participant is distressed and unable to resolve these issues through discussion and reassurance, she will contact the Principle Investigator, Jane Elmslie. Additionally, all participants will be encouraged to visit their GP at any stage during the intervention should they have any concerns regarding their health and wellbeing. In this instance, the study researcher and/or Principle Investigator will collaborate with the participant’s GP to find a solution.

B12. If the study is a clinical trial, are participants to be provided with a card confirming their participation, medication and the contact phone number of the principal investigator?

- Yes
- No

B12.1 Do you intend to inform the participant’s GP that their patient is a participant in this study? (If yes, consent from the participant is required.)

- Yes
- No

B12.2 Do you intend to inform the GP of all clinically significant abnormal results obtained during study conduct?

- Yes
- No

B13. Is the trial being reviewed by a data and safety monitoring board (DSMB)?

- Yes
- No

If yes, who is the funder of the DSMB?

- HRC
- Sponsor
- Other

If ‘Other’, please specify:

Not Applicable

B14. What are the criteria for terminating the study?

Participants may withdraw from this study at any time without giving any reason for doing so. They may also withdraw any or all of the information they have provided to the project by notifying the researcher at least one month after their information has been collected for the proposes of the project. The study researcher (in consultation with the Principle Investigator and/or GP) may withdraw a participant if she deems the participant’s weight loss at weeks 4 or 8 to be too high a rate (unsafe weight loss rate). Participants who experience any adverse health outcomes will be advised to see their GP for assessment and consent to continue.

B15. Will participants be exposed to any potential toxins, mutagens or teratogens?

- Yes
- No

If yes, specify and outline the justification for their use.

Not Applicable
### B16. Will any radiation or radioactive substances be used?  
**Note:** If any form of radiation is being used, please answer B16.1–B16.2.  
If no, go to question B17.

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<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>B16.1 How many x-rays or other procedures are planned for the purposes of this study, i.e., that are not part of standard treatment?</td>
<td>Not Applicable</td>
<td></td>
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<tr>
<td>B16.2 Under whose licence is the radiation being used?</td>
<td>Not Applicable</td>
<td></td>
</tr>
<tr>
<td>B16.3 Has the National Radiation Laboratory (NRL) risk assessment been completed?</td>
<td>Not Applicable</td>
<td></td>
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If yes, please enclose a copy of the risk assessment and a contact name and phone number.  
If no, please explain why not.

### B17. Will any medicines be administered for the purposes of this study?  

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<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>B17.1 If yes, is Standing Committee on Therapeutic Trials (SCOTT) approval required?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>B17.2 Has SCOTT approval been given? (Please attach.)</td>
<td>Yes</td>
<td>No</td>
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### B18. Does the study involve the use of health care resources?  
If yes, please specify:  
Not Applicable

### B19. What effect will this use of resources have on waiting list times for patients, that is, for diagnostic tests or for standard treatments?  
Not Applicable
C. Compensation for harm suffered by participants  
(Operational standard paragraphs 87–95)

(Refer also to Appendix 3 of the Guidelines (NAFG-2009-v1).)

C1. Will participants be treated by, or at the direction of, a registered health professional as part of the research? (Treatment includes screening, diagnosis, for definitions see the Guidelines (NAFG-2009-v1) pages 11-13.)

If no, go to section D. If yes, please answer questions C2–C5.4.

C2. Is the research being carried out principally for the benefit of a manufacturer or distributor of the drug or item in respect of which the research is taking place?

C2.1 If the answer to C2 is yes, please complete Statutory Declaration Form B and answer questions C3–C5.4.

C2.2 If the answer to C2 is no, please complete Statutory Declaration Form A and go to section D.

Depending on all the circumstances, the minimum cover that is likely to be acceptable to the ethics committee is that provided under ACC. In any case, all exclusions to compensation must be clearly and explicitly set out in the participant information sheet, including those that may be described in C5.

C3. Is the manufacturer/distributor’s agreement to provide compensation in accordance with the RMI attached?

C4. Has the manufacturer or distributor agreed to cover any injury/adverse consequence resulting from participation in this research?

C4.1 If no, what qualifications have been specified for cover?

Not Applicable

C4.2 Limiting the type of compensation

C4.2.1 Has the manufacturer or distributor excluded any type of compensation, for example, pain and suffering, loss of earnings, loss of earning capacity, funeral costs, dependents’ allowances or any other financial loss or expenses?

C4.2.2 If yes, please state what is excluded. (Include in the compensation statement on the information sheet)
C5. Limiting liability – exclusion clauses

C5.1 Has the manufacturer or distributor limited or excluded liability if the injury is attributable to the negligence of someone other than the manufacturer or distributor (such as negligence by the investigator, research staff, the hospital or institution, or the participant)?

C5.2 Has the manufacturer or distributor limited or excluded liability if the injury resulted from a significant deviation from the study protocol by someone other than the manufacturer or distributor?

C5.3 Is evidence of the following indemnity insurance attached?

<table>
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<tr>
<th>Sponsor</th>
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<tr>
<td>☐ Yes</td>
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If yes to either C5.1 or C5.2:

<table>
<thead>
<tr>
<th>Hospital/institution</th>
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<tr>
<td>☐ Yes</td>
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<table>
<thead>
<tr>
<th>Investigator</th>
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<tr>
<td>☐ Yes</td>
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C5.4 Is company liability limited in any other way?

If yes, please specify.

Not Applicable

D. Privacy and confidentiality

(Operational standard paragraphs 48–56)

D1. How will potential participants be identified?

Potential participants will identify themselves to us in response to advertising in local print media. Participants who express interest in the study will be contacted directly by the study researcher via telephone for preliminary screening.

D2. How will participants be recruited (for example, advertisements, notices)?

Participants will be recruited by advertisements in local print media.

D3. Where will potential participants be approached (for example, outpatient clinic)? If appropriate, describe by type (for example, students).

Through advertisements in local print media [Appendix II].

D4. Who will make the initial approach to potential participants?

Participants themselves will make the initial approach (in response to advertisements) by emailing or phoning the student researcher (TBA).

NB: Do not include information on storage and use of tissue samples and related information in the following questions. That is covered separately under Part 5.
D5. How will data, including audio- and videotapes, be handled and stored to safeguard confidentiality (both during and after completion of the research project)?

During the data collection, analysis and write up phase of the study, all data (screening, anthropometric, food records, weight-related psychological questionnaires, and week-12 questions) will be stored in a locked filing cabinet in the Department of Human Nutrition Building, University of Otago, Dunedin. The student researcher (TBA), will hold the key. Upon project completion, all data will be sent to Jane Elmslie at the National Addiction Centre in Christchurch, where it will be held securely for 10 years.

D6. What will be done with the raw data when the study is finished?

When the study is finished, all data will be sent to Jane Elmslie at the National Addiction Centre in Christchurch, where it will be held securely for 10 years.

D7. How long will the data from the study be kept, and who will be responsible for their safe keeping? (Health information relating to an identifiable individual must be retained for at least 10 years, or in the case of a child, 10 years from the age of 16.)

Jane Elmslie will be responsible for the safekeeping of the study data and it will be kept for 10 years in a locked facility in the National Addiction Centre in Christchurch.

D8. Name those who will have access to the raw data, participant information and/or clinical records during, or after, the study?

The Principle Investigator; Dr Jane Elmslie, and co-investigators; Dr Ria Schroder, and the student researcher (TBA). Additional researchers involved in potential future research related to this study may also have access, at the discretion of Dr Jane Elmslie.

D9. Describe any arrangements to make results available to participants, including whether they will be offered their audio- or videotapes.

Participants will be asked if they would like a summary of study results and/or copies of their individual assessment data. Requested information will be forwarded on completion of the final report.

E. Informed consent

(Operational standard paragraphs 28–43)

A participant’s informed consent should be obtained in writing, unless the procedures are not experimental and there are good reasons for not requiring written consent. If consent is not to be obtained in writing, the justification should be given and the circumstances under which consent is obtained should be recorded. Attach a copy of the information sheet and consent form provided to participants.

E1. By whom, and how, will the project be explained to potential participants?

The student researcher (TBA), will explain the project to participants during initial telephone screening. The information sheet will provide comprehensive explanation.

E2. When and where will the explanation be given?

Further clarification about the study will be provided during the participants first visit to the Department of Human Nutrition, University of Otago, Dunedin.
<table>
<thead>
<tr>
<th>E3. Will a competent interpreter be available, if required?</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>If no, why not?</td>
<td></td>
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<tr>
<td>Due to time and resource constraints, all participants will need to be fluent in oral and written English.</td>
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<tr>
<th>E4. How much time will be allowed for the potential participant to decide about taking part in the project?</th>
<th>For the duration of the advertising period; 6-8 weeks maximum.</th>
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<tr>
<th>E5. In what form (written, or oral) will consent be obtained? If oral consent only, state reasons.</th>
<th>Written.</th>
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<tr>
<th>E6. If recordings are made, will participants be offered the opportunity to edit the transcripts of the recordings?</th>
<th>Yes</th>
<th>No</th>
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<tr>
<th>E7. Will data or other information be stored for use in a different study for which ethics committee approval would be required?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>E7.1 If yes, please explain how. All assessment data from this study may be utilized in subsequent related research comparing moderation guidelines for NEEDNT foods to other obesity treatment modalities.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E8. Is there any special relationship between the participants and the researchers (for example, doctor/patient, student/teacher)?</th>
<th>No.</th>
</tr>
</thead>
</table>

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<tr>
<th>E9. Will there be any financial cost to the participant, for example, travel and parking costs? If so, will such cost be reimbursed? (Refer to the Guidelines (NAFG-2009-v1).)</th>
<th>Participants will pay for their own travel and parking expenses to attend visits on campus at the University of Otago, Dunedin. Due to funding constraints they will not be reimbursed.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>E10. Will any payments be made to participants, or will they gain materially in other ways from participating in this project?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>E10.1 If yes, please supply details. Not Applicable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
F. Cultural and social responsibility

(Operational standard paragraphs 73–82)

Section F enshrines two fundamental principles. They are:

i. Culturally safe research practice: Research involving participants from specific ethnic or socially identified groups (even when small numbers from each group are involved) must involve those participant groups in the research process as full participants. Where a particular ethnic or socially identified group is the principal subject of the research, there must be engagement with appropriate parties, and this process must be outlined in the application.

ii. If the research is in an area of health inequalities, then the researcher must demonstrate how the research will contribute to achieving equity of outcomes for those population groups most in need within the public good health system.

F1. Have you read the HRC booklet Guidelines for Researchers on Health Research Involving Māori?

[ ] Yes [ ] No

Relevance and responsiveness to Māori

F2. All health research conducted in Aotearoa New Zealand is of relevance to Māori. How relevant is a decision to be made by Māori. The researcher must be able to articulate the context and the relevance of the proposed research to Māori and the possible consequences for Māori health outcomes, and generally, the greater the degree of relevance to Māori, the greater the expectation of participation of Māori and hence consultation expectations.

<table>
<thead>
<tr>
<th>F2.1 Given your approach to sampling, what are the anticipated numbers of Māori participants?</th>
<th>In 2006 people of Māori ethnicity constituted 6.5% of the Dunedin population (Statistics New Zealand website). It is therefore likely that the numbers of Māori volunteering to participate in the study will be small.</th>
</tr>
</thead>
</table>

<table>
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<tr>
<th>F2.2 What is the incidence among Māori of the health issue/disability relevant to the study?</th>
<th>The Ministry of Health’s Adult Nutrition Survey (2008/09) found the prevalence of obesity to be 40.7% in Māori males and 48.1% in Māori females. To put this into context, Māori males and females were 1.5 and 2 times more likely to be obese, compared to non-Māori males and females, respectively. This data demonstrates that Māori are disproportionately affected by obesity in New Zealand.</th>
</tr>
</thead>
</table>

F3. Please explain how this research will contribute to improving Māori health outcomes and reducing health inequalities for Māori.

This research is of particular relevance to Māori, whom, as a group are disproportionately affected by obesity and obesity-related co-morbidities. This research aims to address He Korowai Oranga by developing an effective and comprehensive tool for weight-management that can be used in a collaborative way; between health provider, Māori, and their whānau.

F4. Describe the process by which Māori have been engaged in the conception and design of the proposed research. Please identify the group/s with which consultation has taken place and outline their stated view about the proposed research. Please attach their letter/s of support for this specific research project.

Consultation on the development of the NEEDNT foods list has been on-going with a group of Māori research participants based in Christchurch. The current study has built upon this consultation by meeting with Mark Brunton, Kaitakawaenga Rangahau Māori (Facilitator Research Māori) and Dr Lisa Te Morenga to gain their valuable input regarding how to maximise Māori participation and how to best engage with Māori participants.
F4.1 Describe any ongoing involvement the group(s) consulted have in the project.

Mark Brunton and Dr Lisa Te Morenga will be consulted during the study if required. Additionally, the study will be advertised in the local Arai Te Uru Whare Hauora as recommended during Māori consultation.

F4.2 Describe how information will be disseminated to participants and the group(s) consulted during and at the conclusion of the research project.

Findings of this research will be distributed to all participants and to local Arai Te Uru Whare Hauora as recommended by Mark Brunton.

Responsiveness to ethnic peoples

F5. What other ethnic groups will be participating in this research based on your sampling frame (for example, Pacific peoples or Asian peoples)?

The study is open to people from all ethnicities provided that they are sufficiently fluent in English to participate.

F5.1 Are there any aspects of the research based on participation or the relevance of the research to specific ethnic groups that might raise specific cultural issues?  

☐ Yes ☑ No

If yes, please outline.  
If no, go to F6.

F5.2 How can this research contribute to reducing inequalities for ethnic peoples in the New Zealand health system?

Not Applicable

F5.3 Describe what consultation has taken place with specific ethnic group(s) prior to the project’s development and attach evidence of their support.

Not Applicable
F5.4 Describe any ongoing involvement the group(s) consulted have in the project.
   Not Applicable

F5.5 Describe how you intend to disseminate information to participants and the group(s) consulted at the end of the project.
   Not Applicable

Responsiveness to other peoples of interest

F6. Are there any aspects of the research based on participation or the relevance of the research to specific peoples of interest that might raise specific issues for such communities (for example, for prisoners, people with disabilities, people with diverse sexual identities)?
   If yes, please outline.  
   If no, go to F7.
   Not Applicable

F6.1 How can this research contribute to reducing inequalities for other peoples of interest in the New Zealand health system?
   Not Applicable

F6.2 Describe what consultation has taken place with specific peoples of interest group(s) prior to the project’s development and attach evidence of their support.
   Not Applicable

F6.3 Describe any ongoing involvement the group(s) consulted have in the project.
   Not Applicable
F6.4 Describe how you intend to disseminate information to participants and the group(s) consulted at the end of the project.

| Not Applicable |

F7. Will the study drug/treatment continue to be available to the participant after the study ends?

<table>
<thead>
<tr>
<th>F7.1 If yes, will there be a cost, and how will this be met?</th>
<th>There will be no cost.</th>
</tr>
</thead>
<tbody>
<tr>
<td>F7.2 If no, why not?</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>F7.3 If there was a placebo arm, what will happen to these participants at the end of the study?</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

*Note: This information needs to be included in the information sheet.*
Part 3: General

Describe and discuss any ethical issues arising from this project, other than those already dealt with in your answers above.

We can think of no other ethical issues arising from this study that have not already been addressed in previous answers.

Thank you for your assistance in helping us assess your project fully.

Please now complete:
the declarations (Part 4). If there is more than one site, include a declaration for each site.

If applicable complete:
a Registered Drug Form
Form A or B
Part 5
Part 6
Part 7
Part 8

Attach:
Checklist to ensure all relevant documents are attached. Incomplete applications will not be reviewed.
Appendix B: Study protocol

DEPARTMENT OF HUMAN NUTRITION
UNIVERSITY OF OTAGO DUNEDIN

STUDY PROTOCOL

‘Development and Pilot Evaluation of NEEDNT Foods List Moderation Guidelines’
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COLLECTION, USE, AND PROTECTION OF DATA .......... Page 5
INTERVENTION OVERVIEW & PATIENT STUDY VISITS .... Pages 6-7
INVESTIGATORS:

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Jane Elmslie</td>
<td>Department of Psychological Medicine, Christchurch</td>
<td>(Principle Investigator)</td>
</tr>
<tr>
<td>Dr Ria Schroder</td>
<td>Department of Psychological Medicine, Christchurch School of Medicine</td>
<td>(Co-Investigator)</td>
</tr>
<tr>
<td>Dietetic Master’s Student</td>
<td>Department of Human Nutrition, University of Otago, Dunedin</td>
<td>(Student Researcher)</td>
</tr>
</tbody>
</table>

CONTACT PHONE NUMBERS:

Dr Jane Elmslie: 03 364 0480 or 027 646 0098
Dr Ria Schroder: 03 364 0480 or 027 2017152
Dietetic Master’s Student: To Be Advised
STUDY OUTLINE

Hypothesis:
Explicit guidelines to enable people with obesity to moderate their intakes of non-essential energy-dense, nutritionally deficient foods (NEEDNT foods) will improve diet quality and promote weight loss.

Design:
Develop moderation guidelines for consumption of foods on the NEEDNT food list (Elmslie et al, 2012) and evaluate prospectively in 50 people with BMI ≥30 and ≥1 previous weight-loss attempt.

Aim:
To evaluate the effect of the NEEDNT Food List Moderation Guidelines on dietary intake, weight, waist circumference and weight-related psychological outcomes.

Intervention:
 Provision of guidelines for moderating intakes of non-essential energy-dense, nutritionally deficient foods.

Duration:
12-weeks

Participants:
N= 50 people with BMI ≥30 and ≥1 previous weight-loss attempt.

Inclusion Criteria:
Aged 18-65, BMI ≥30 m²/kg

Exclusion Criteria:
Weight loss of ≥5% in the last 6 months, taking insulin, steroids, atypical antipsychotic medications, or weight-loss medications. pregnant or intending to become pregnant in the next 12-weeks, past or current history of Anorexia or Bulimia Nervosa. If people are identified as being at risk of anorexia/bulimia during EDE-Q screening, notify GP and suggest referral to ED service.

Measures:
Baseline: Height, weight, waist circumference, 7-day food record, Eating Compulsivity Assessment, TCI, TFEQ, EDE-Q and DEBQ.
Weeks 4 and 8: Weight.
Week 12: Weight, waist circumference, 7-day food record, Eating Compulsivity Assessment, TFEQ, EDE-Q and DEBQ, and a general qualitative questionnaire about has the study influenced their understanding of moderation, how easy was the list to use, how logical etc.

Outcomes/Analysis:
Changes in dietary intake (energy, % energy from macronutrients, alcohol and sucrose). NEEDNT foods intake, bodyweight, waist circumference, eating Compulsivity, TFEQ, EDE-Q and DEBQ assessed by repeated measures within subjects’ t-tests. Thematic analysis of responses to week 12 questions.
COLLECTION, USE, AND PROTECTION OF DATA

All research procedures and assessments will take place in the Department of Human Nutrition at the University of Otago in Dunedin. Some questionnaires and dietary information will be collected by way of self-administered questionnaires within participants’ own homes.

A telephone screening form (Appendix III) will be used by the study researcher to identify suitable persons from those who respond to newspaper advertising (Appendix II) for the study. An Information Sheet (Appendix V) explaining the implications and requirements of the study will be provided by post along with a Consent Form (Appendix IV), which will be signed and returned to the study researcher in self-addressed stamped envelopes. The Temperament and Character Inventory Questionnaire (Appendix VI) and a 7-Day Food Record (Appendix VII) will be provided to participants by post and returned to the study researcher in self-addressed stamped envelopes. The Eating Compulsivity Assessment (currently in development by Dr Ria Schroder, co-investigator), Eating Disorder Examination Questionnaire (Appendix IX) and Dutch Eating Behaviour Questionnaire (Appendix VIII) will be administered in the Department of Human Nutrition by the study researcher. Anthropometric data will be obtained in the Department of Human Nutrition at the University of Otago in Dunedin. Dietary data from written food records will be analysed using Diet Cruncher, Diet Analysis Nutrition Software Version 1.2.0 (Way Down South Software, 2004). A brief written questionnaire (Appendix XI) will be administered at week 12; either in the Human Nutrition Department, or, self-administered within participants’ homes and returned to the study researcher in self-addressed stamped envelopes.

During the data collection, analysis and write up phase of the study, all data (screening, anthropometric, food records, weight-related psychological questionnaires, and week-12 questions) will be stored in a locked filing cabinet in the Department of Human Nutrition Building, University of Otago, Dunedin. The study researcher, Renee Graham, will hold the key. Upon project completion, all data will be transferred securely to Dr Jane Elmslie; who will be will be responsible for the safekeeping of this study’s data, at the National Addiction Centre in Christchurch, where it will be held securely for 10 years. The Principle Investigator; Dr Jane Elmslie, and co-investigators; Dr Ria Schroder, and Renee Graham, will be the only persons with access to raw data and participant information during and after the study. However, assessment data from this study may be utilized in subsequent related research comparing moderation guidelines for NEEDNT foods to other obesity treatment modalities, so additional researchers may access the raw data for this purpose at the discretion of Dr Jane Elmslie. Informed consent will be gained from participants to allow this. Participants will be asked if they would like a summary of study results and/or copies of their individual assessment data: anthropometry, food records, dietary analysis, completed questionnaires. Requested information will be forwarded on completion of the final report.
### INTERVENTION OVERVIEW & PATIENT STUDY VISITS:

<table>
<thead>
<tr>
<th>STEP</th>
<th>ACTIVITY</th>
<th>ALLOW</th>
<th>COMPLETE</th>
</tr>
</thead>
</table>
| 1    | Conduct Literature Review  
      | Develop Moderation Guidelines for consumption of NEEDNT foods 
      | Complete and submit National Ethics Application | 3 MONTH PERIOD |
| 2    | Recruit participants via advertisement in local newspapers | 6-8 WEEK PERIOD |
| 3    | Conduct Telephone Screening  
      | Provision of Participant Information Sheet 
      | Attainment of Participant Consent | 2-3 HOURS PER PARTICIPANT |
| 4    | Send to participants by post for self-completion:  
      | 7-Day Food Record with instructional DVD 
      | Temperament and Character Inventory (TCI) | 4-5 HOURS PER PARTICIPANT |
| 5    | 1st Patient Visit: Week 1 of Intervention:  
      | Administer Baseline Questionnaires:  
      | Eating Compulsivity Questionnaire (in development by Dr Ria Schroder for this project) 
      | Three Factor Eating Questionnaire (TFEQ) 
      | Eating Disorders Examination (EDE-Q) 
      | Dutch Eating Behaviour Questionnaire (DEBQ) 
      | Provide education session for NEEDNT Moderation Guidelines to participants. 
      | Conduct baseline anthropometric data collection: height, weight, and waist circumference | 2-3 HOURS FOR PARTICIPANT GROUP |
| 6    | 2nd Patient Visit: Week 4 of Intervention:  
      | Collect anthropometric data: weight | 2-3 HOURS FOR PARTICIPANT GROUP |
| 7    | 3rd Patient Visit: Week 8 of Intervention:  
      | Collect anthropometric data: weight | 2-3 HOURS FOR PARTICIPANT GROUP |
| 8    | Send to participants by post for self-completion:  
      | 7-Day Food Record | 4 HOURS PER PARTICIPANT |
| 9    | 4th (Final) Patient Visit: Week 12 of Intervention:  
      | Readminister Baseline Questionnaires:  
      | Eating Compulsivity Questionnaire (in development by Dr Ria Schroder for this project) 
      | Three Factor Eating Questionnaire (TFEQ) 
      | Eating Disorders Examination (EDE-Q) 
      | Dutch Eating Behaviour Questionnaire (DEBQ) 
      | Conduct Week 12 anthropometric data collection: height, weight, and waist circumference 
      | Administer Week 12 Participant Questionnaire regarding ease of use and general feedback | 3-4 HOURS FOR PARTICIPANT GROUP |
| 10   | Collation, analysis and formal write up of intervention results  
      | Provision of results to participants and their GPs | 2-3 MONTH PERIOD |
Department of Human Nutrition
University of Otago, Dunedin, New Zealand

PARTICIPANT CONSENT FORM:

The NEEDNT Food List Moderation Guidelines Pretest Study

PLEASE TICK the box beside each statement to indicate your understanding and/or agreement.

I have read and understood the Participant Information document outlining a 4-week pretest study, designed to gain feedback on NEEDNT foods moderation guidelines, in persons considered clinically obese.

I understand that my participation in this study requires me to adhere as best I can to the NEEDNT foods moderation guidelines provided by the study researcher. I understand these guidelines will be explained to me in full prior to the 4-week pretest phase and that I will have the opportunity to ask questions to clarify anything I am unsure about at any stage of the study.

I have had the opportunity to discuss this study and I am satisfied with the answers that I have been given so far.

I have had the opportunity to use family/whānau support or a friend to help me ask questions and understand the study.

I have had adequate time to consider whether to take part in this study.

I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time and this will in no way affect my future healthcare.

I understand that my participation in this study is confidential and that no material that could identify me will be used in any reports or publications on this study.

I understand that I can stop using the guidelines at any time if they should appear harmful to me.

I know whom to contact if I feel any distress or have any concerns as a result of my participation in this study.

I agree to the final interview that will be conducted after I have used the guidelines for four weeks to be audio recorded.
**PLEASE TICK the box beside each statement to indicate your understanding and/or agreement.**

I understand this study is a Student Masters project with limited funding; therefore I will not receive reimbursement for my time or travel costs. I understand that I will not receive any reimbursement for food costs; however, trialling the moderation guidelines will be free of charge.

I consent to the researchers storing all my personal documentation collected as part of this study in a secure facility and in a manner that does not identify me personally, for use as part of this study and potential future research related to this study.

I agree to my GP or other current healthcare provider being informed of my participation in this study and the results of my participation in this study.

(Women participants only)
I understand that I cannot be pregnant or should not be trying to get pregnant while being involved in this study

I understand that all participants will receive a summary of the study findings on completion of the trial, which will be posted to the address provided below.

If you **DO NOT** wish to receive this summary **please tick** the box

Please provide the address to which you would like a copy of the results sent:

Phone: home: ........................ work: ........................ mobile: ........................

Email: ..........................................................................................................................

Participant Declaration of Consent:

I ........................................................ (full name) hereby consent to taking part in this study.

Date: ......./........../.........  Signature:.................................................................
The NEEDNT Food List Moderation Guidelines Pretest Study – Participant Consent Form V3 05/10/12

Department of Human Nutrition
University of Otago
PO Box 56 Dunedin
New Zealand

Telephone: +64 3 479 4856
FAX: +64 3 479 7958
Email: needntfoodlist@otago.ac.nz

Study Researcher Disclosure:

Project explained by: ..........................................................................................................................................
Project role: ..................................................................................................................................................
Signature: .......................................................... Date: .............................................

Contact Details:

**Study Researcher:** Renee Graham
Department of Human Nutrition
University of Otago, Dunedin
PO Box 56
Dunedin, 9054

Phone or text: 027 920 1313
Email needntfoodlist@otago.ac.nz
Fax: 03 479 7958

**Principal Investigator:** Dr Jane Elmslie
**Co-Investigator:** Dr Ria Schroder
National Addiction Centre
Department of Psychological Medicine
University of Otago, Christchurch
PO Box 4345
Christchurch Mail Centre
Christchurch 8140
Ph. 03 364 0480 or 0800 233-428
Email: jane.elmslie@otago.ac.nz; ria.schroder@otago.ac.nz

Ethics Ref: LRS/12/05/010
PARTICIPANT INFORMATION SHEET:

The NEEDNT Food List Moderation Guidelines Pretest Study

Introduction
We would like to invite you to take part in this study to evaluate a new treatment paradigm for weight-management in those considered obese. Obesity is assessed using a calculation called ‘body mass index’, or BMI, which measures your weight relative to your height. It is a basic gauge, but gives a rough idea of whether you are overweight or not. A BMI of 30 or above is considered obese based on current medical criteria.

This study has been designed to give people with a BMI of 30 or above the opportunity to learn and follow dietary guidelines over a four-week period, and to provide individual feedback about their experiences of using these guidelines. Participants may experience weight-loss during this period and will have the opportunity to continue following the guidelines after completion of the four-week study period.

The development of the guidelines came about because many people have difficulty with the concept of dietary ‘moderation’, a term which is often used to describe a balanced or ideal approach to eating. However, the concept of moderation - while sensible - has not been well defined and therefore is open to individual interpretation. For example, one person may consider their intake of ‘treat’ foods to be quite acceptable, whereas another person may perceive that same intake as overly indulgent or unhealthy. This ambiguity can make it hard for overweight or obese people to achieve a healthier weight.

Additionally, the food market often complicates our food decisions, by providing complex nutrition information and labelling, which can be difficult to interpret. Many of the foods available in our food environment are especially high in calories or kilojoules (‘food energy’) from fat and sugar, while being low in the nutrients we need for good health. Two researchers of this study have recently published a list of foods, and called them ‘non-essential, energy-dense, nutritionally-deficient’ foods, or ‘NEEDNT’ foods for short.

This study aims to observe and gain broad feedback from participants about their experiences of using newly developed moderation guidelines over a four-week period. These guidelines stipulate daily and weekly allowances of NEEDNT foods in quantified servings. Participants will be provided with comprehensive instruction regarding how to use the guidelines. After following the guidelines for four weeks, the study researcher will facilitate flexible, one-on-one interviews, where you will be asked to provide comments and feedback about your experience of using the guidelines. You may choose, for example, to talk about the design or layout, wording, usability and appeal, things that worked well, things that didn’t work well, possible reasons for this, how this experience compares to your previous weight-loss approaches, and/or anything else you wish.

Who are the researchers of this study?
The study is being conducted by Dr Jane Elmslie and Dr Ria Schroder of the National Addiction Centre in the Department of Psychological Medicine, University of Otago, Christchurch, and a Masters in Dietetics Candidate, Renee Graham of the Department of Human Nutrition, University of Otago, Dunedin. Renee is the study researcher and will be your main point of contact throughout the study.
Who is eligible to take part?

Adult men and women aged 18-65 years of age who are fluent in oral, written and numerical English language, who are willing and able to give informed consent for assessment and treatment;

Who currently have a BMI of 30 or above, want to lose weight, and have not lost ≥5% of their total body weight within the last six months;

Who are currently registered with a general medical practitioner (GP);

Are not taking insulin, steroids, atypical antipsychotic medications, or weight loss medications;

Do not have a past or current history of Anorexia, Bulimia Nervosa or EDNOS;

Are not currently pregnant, breastfeeding, or planning on becoming pregnant within the next four weeks.

What will happen during the study?

The study comprises several phases: recruitment, initial screening, consent, provision of introductory information and education about using the guidelines, and obtaining feedback about experiences of using the guidelines. Ten to twenty people; male or female and of any ethnicity, aged 18-65 years, with a BMI of 30 or above, will be recruited through an advertisement, distributed via bulk email and in flyer format, throughout the University of Otago Dunedin campus, Dunedin Public Hospital, Aurora Health Clinic in South Dunedin, and local Araki Te Uru Whare Hauora. Persons who respond will be screened by telephone to ensure suitability based on eligibility criteria. Ten eligible participants will be selected and will receive comprehensive information about the study prior to giving consent. Verbal instructions and a print copy of the guidelines will be provided to participants prior to commencing week one of using the guidelines. Participants will be telephoned at the end of week two and asked a few open-ended questions regarding their experience so far. Participants will continue following the guidelines for another two weeks, and will then provide feedback through an individual semi-structured interview. The study researcher, Renee Graham, will provide all abovementioned instructions and resources, and will conduct feedback interviews.

What are the risks and/or inconveniences of being in this study?

The risks of being in this study are minimal. It is possible you could misinterpret the moderation guidelines and over restrict your calorie intake (the amount of food you eat) which is not the goal of following these guidelines. However, we will minimise this risk by providing you with clear instructions and education about how to use the moderation guidelines. We will also encourage you to maintain close contact with the study researcher and to ask any questions you may have throughout the course of the study. This study does require you to give your time, your opinions, and information regarding your personal experience; however, we hope your participation will provide you with new insights, knowledge and tools to continue your weight-loss after the four-week period.

What Happens After the Initial Telephone Screening?

Following screening participants will be invited to meet with Renee Graham individually at the Human Nutrition Clinic (University of Otago Dunedin Campus) where you will be provided with a complete explanation on how to use the guidelines. Renee will answer questions you may have at this session, and if you are happy to proceed, you will then be asked to sign a consent form. Participants will then commence with following the guidelines for four weeks. At the end of week two, Renee Graham will phone you at a prearranged time to gain feedback on how you are progressing (10-15 minutes duration). Immediately after the four-week period, Renee will arrange to meet with you in person for a feedback interview (up to one-hour duration). This session will be audio recorded and transcribed into written format that omits any information that could identify you personally. Audio recordings will be stored securely.

What is the timeframe for the study?

The timeframe for pretesting (using guidelines) is four weeks. Participants may need to allow up to a week between initial telephone screening and commencement of pretesting, and another week after completion of the four week pretesting phase, to allow for scheduling of the conversational feedback interview; giving a total of 6-weeks.

How many visits will there be during the study?

At most the project will involve two visits to the Human Nutrition Clinic (University of Otago Campus): once for the introductory session and once for the feedback interview. Participants also have the choice to have the interview conducted within their own homes.
What are the potential benefits of being in this study?
All participants will benefit from the opportunity to use the guidelines and will gain insights and strategies for personal weight-management. Your participation in this study, and the personal feedback you provide, will allow us to further develop the moderation guidelines, and in doing so, to improve weight-management treatment for those affected by obesity. As a gesture of gratitude for your valuable contribution, you will each have the opportunity to have a one-on-one follow-up consult with Renee (a final year student Dietitian) to assist you with a plan to manage your weight-management in future.

Will being in the study cost me anything and will I receive payment or reimbursement for expenses?
There will be no cost to you as a result of receiving the resources or support provided in this study. However, as this is a student project with limited funding, we are unfortunately not able to reimburse you for travel or parking costs incurred during your visits to the Department of Human Nutrition, or to provide monetary compensation for your participation.

Basis of participation
Your participation is entirely voluntary (your choice) and you may choose to withdraw from the study at any time. Should you decide to withdraw, the study researcher may request to know your reasons for doing so; however, you are not obliged to give your reasons if you do not want to. Withdrawal from the study will in no way affect your future health care.

Will my GP know that I am in the study?
Yes, your GP will be informed of your participation in this study once you have signed the consent document. A copy of this information sheet will be provided to him/her. If you have any concerns about the study at any stage, please feel free to discuss them with the either the study researcher or your own doctor.

Confidentiality
The information that you give will be treated in the strictest confidence. All personal information, interview notes and recordings/transcripts will be stored securely both during and after the study. Publication of our results will similarly be done in such a way that the individuals involved in the study cannot be identified in any way.

As part of giving consent to participate in this study, we will ask your permission to reuse your results in future research conducted on the NEEDNT food moderation guidelines, and, whether you are willing to be contacted to participate in such studies. If you choose not to give consent for future study involvement, you will still be able to participate in the current study.

We may need to obtain your medical records to clarify details of any current medications or treatment. If this is necessary we will inform you prior to contacting you GP.

How can I get the results of the study and where will they be published?
We will endeavour to publish the overall results of this study in a suitable medical journal. The study researcher will forward you a copy of this document, whether published or not.
Precautions to be taken
In the unlikely event of a physical injury as a result of your participation in this study, you will be covered by the accident compensation legislation with its limitations. If you have questions about ACC please feel free to ask the study researcher for more information before you agree to take part in this study.

While we do not anticipate any adverse psychological outcomes from this study, psychological support will be available to you at all times throughout the study should you need it. If you experience any physical or psychological distress as a result of being a participant in the study you should contact Renee immediately and she will assist you to access appropriate support if you require this. For all other medical matters you should contact your GP.

If you have any queries or concerns regarding your rights as a participant in this research study, you can contact an independent health and disability advocate. This is a free service provided under the Health and Disability Commissioner Act.
Telephone (NZ wide) 0800 555 050.
Free Fax (NZ wide): 0800 2787 7678 (0800 2 SUPPORT)
Email (NZ wide): advocacy@hdc.org.nz

This study has received ethical approval from the Lower South Regional Ethics Committee.

Where can I get more information about the study?
Renee Graham may be contacted on the following numbers or email below. Please feel free to leave a voice message or text message on her cell phone, or a message with her office colleagues, and she will get back to you as soon as possible:

Study Researcher: Renée Graham
Department of Human Nutrition
University of Otago, Dunedin
PO Box 56
Dunedin, 9054

Phone or text: 027 920 1313 (study cell) or 027 363 3977 (personal cell)
Email needntfoodlist@otago.ac.nz
Fax: 03 479 7958

Principal Investigator: Dr Jane Elmslie
Co-Investigator: Dr Ria Schroder
Research Fellows
National Addiction Centre
Department of Psychological Medicine
University of Otago, Christchurch,
PO Box 4345
Christchurch Mail Centre
Christchurch 8140
Ph, (03) 364 0480
Fax (03) 364 1225
Email jane.elmslie@otago.ac.nz; ria.schroder@otago.ac.nz

Ethics Ref: LRS/12/05/010

The NEEDNT Food List Moderation Guidelines Pretest Study – Participant Information Sheet V3 05/10/12
Department of Human Nutrition
University of Otago, Dunedin
‘The NEEDNT Food List
Moderation Guidelines Pretest Study’

Did you hear about the list of foods we NEEDNT eat?
…Or that Blacklist of Foods to Avoid?

Are you intrigued to know what it’s really all about?

Otago University researchers have developed some user-friendly guidelines to help people lose weight by regulating the amounts of certain high-calorie foods that tend to promote weight-gain & poor health when eaten habitually.

We are seeking 10 people to learn and follow these guidelines for 4-weeks and give us your views and comments about your experience!

What’s in it for you?

The opportunity to lose weight with guidance & support
Learn about how much “treat” food you can actually eat
The chance to give valuable personal feedback that may improve weight management for others like you
A one-on-one consult with a final year Student Dietitian to assist you with maintaining your weight loss after the study period

So, if you are:
18-65 years of age, with a BMI of 30 or above, and have tried to lose weight before, we would love to hear from you. If you aren’t sure what you BMI is, Google search ‘BMI calculator’ or feel free to contact us

For more info or to register your interest
Please contact Renée Graham on
027 920 1313 (texts welcome) or
email NeedntFoodList@otago.ac.nz

The Lower South Regional Ethics Committee has approved this study; Reference LRS/12/05/010

This study is being conducted by Masters in Dietetics Candidate Renee Graham under the supervision of Dr Jane Elmslie (Principle Investigator) & Dr Ria Schroder (Co-Investigator). National Addiction Centre, University of Otago, Christchurch, Phone 03 364 0480
Appendix F: Māori consultation

NGĀI TAHU RESEARCH CONSULTATION COMMITTEE
Te Komiti Rakahau ki Kai Tahu

21/08/2012 - 58
Tuesday, 21 August 2012

Dr Elmslie
Psychological Medicine
Christchurch

Tēnā koe Dr Elmslie

Title: Development and Pilot Evaluation of NEEDNT Foods List Moderation Guidelines.

The Ngāi Tahu Research Consultation Committee (The Committee) met on Tuesday, 21 August 2012 to discuss your research proposition.

By way of introduction, this response from the Committee is provided as part of the Memorandum of Understanding between Te Rūnanga o Ngāi Tahu and the University. In the statement of principles of the memorandum, it states "Ngāi Tahu acknowledges that the consultation process outlined in this policy provides no power of veto by Ngāi Tahu to research undertaken at the University of Otago". As such, this response is not "approval" or "mandate" for the research, rather it is a mandated response from a Ngāi Tahu appointed committee. This process is part of a number of requirements for researchers to undertake and does not cover other issues relating to ethics, including methodology; they are separate requirements with other committees, for example the Human Ethics Committee, etc.

Within the context of the Policy for Research Consultation with Māori, the Committee base consultation on that defined by Justice McGechan:

"Consultation does not mean negotiation or agreement. It means: setting out a proposal not fully decided upon; adequately informing a party about relevant information upon which the proposal is based; listening to what the others have to say with an open mind (in that there is room to be persuaded against the proposal); undertaking that task in a genuine and not cosmetic manner. Reaching a decision that may or may not alter the original proposal."

The Committee considers the research to be of importance to Māori health.

As this study involves human participants, the Committee strongly encourage that ethnicity data be collected as part of the research project. That is the questions on self-identified ethnicity and descent, these questions are contained in the 2006 census.


The Ngāi Tahu Research Consultation Committee has membership from:
Te Rūnanga o Otago Incorporated
Kōti Hapū Haumāna ki Puketawā
Te Rūnanga o Moeraki

197
Māori health issues and will assist in ensuring your research has an appropriate Māori health focus.

The Committee suggests dissemination of the research findings to Māori health organisations regarding this study.

We wish you every success in your research and the Committee also requests a copy of the research findings.

This letter of suggestion, recommendation and advice is current for an 18 month period from Tuesday, 21 August 2012 to 21 February 2014.

The recommendations and suggestions above are provided on your proposal submitted through the consultation website process. These recommendations and suggestions do not necessarily relate to ethical issues with the research, including methodology. Other committees may also provide feedback in these areas.

Nāhaku noa, nā

Mark Brunton
Kaiwhakahaere Rangahau Māori
Facilitator Research Māori
Research Division
Te Whare Wānanga o Otago
Ph: +64 3 479 8738
email: mark.brunton@otago.ac.nz
Web: www.otago.ac.nz

The Ngāi Tahu Research Consultation Committee has membership from:
Te Rūnanga o Ōtepoti Incorporated
Kētū Horāpopo Rūnanga ki Puketāpāki
Te Rūnanga o Mokai
Appendix G: Locality assessment

### Locality Assessment by Locality Organisation

Refer to pages 13–15 of Guidelines for Completion of the National Application Form for Ethical Approval of a Research Project (NAFG-2009-v1).

#### Locality organisation sign off

Ethics committees review whether investigators have ensured their studies would meet established ethical standards if conducted at appropriate localities. Each locality organisation is asked to use the locality assessment form to check that the investigator has also made the appropriate local study arrangements.

Ethics approval for study conduct at each site is conditional on favourable locality assessment at that locality.

Please note that the locality organisation may have additional requirements to be met before a study may commence at that locality.

#### Part One: General

To be completed by the principal investigator for this locality.

<table>
<thead>
<tr>
<th>Full project title:</th>
<th>Development and Pilot Evaluation of NEEDNT Foods List Moderation Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short project title:</td>
<td>The ‘NEEDNT Foods’ Moderation Guidelines Pilot Study</td>
</tr>
<tr>
<td>Locality to be assessed:</td>
<td>Department of Human Nutrition University of Otago PO Box 56 Dunedin 9054</td>
</tr>
<tr>
<td>Brief outline of study:</td>
<td>This study is a student Masters project which aims to investigate a new treatment modality for obesity management by developing and pilot testing specific moderation guidelines for the consumption of certain high calorie foods, called NEEDNT foods. NEEDNT foods are 'non-essential, energy-dense, nutritionally-deficient foods' which when eaten in excess undermine people's attempts to lose weight. Fifty people, with BMI ≥30 and at least 1 previous unsuccessful weight loss attempt will follow specific moderation guidelines for 50 'NEEDNT' foods, for a 12 week period. Key outcomes will be: changes in dietary intake, NEEDNT foods intake, body weight, waist circumference, and weight-related psychological outcomes. Measurements will be taken before the intervention starts and upon completion of the intervention.</td>
</tr>
<tr>
<td>Principal investigator (for this locality):</td>
<td>Renee Graham (MDiet Student)</td>
</tr>
<tr>
<td>Contact details:</td>
<td>Tel: +64 3 479 7959 Mobile: 027 363 3977 Fax: +64 3 479 7958 Email: <a href="mailto:grare630@student.otago.ac.nz">grare630@student.otago.ac.nz</a></td>
</tr>
<tr>
<td>Other local investigators (list all at this site):</td>
<td>None</td>
</tr>
</tbody>
</table>
Part Two: Locality Issues

To be completed by the principal investigator for this locality and signed by the authorised locality representative. (See the Guidelines (NAFG-2009-v1) (pages 13–15) for more information and examples.) Identify any local issues and specify how these issues will be addressed.

1. **Suitability of local researcher**
   For example, are all roles for the investigator(s) at the local site appropriate (for example, has any conflict the investigator might have between her or his local roles in research and in patient care been adequately resolved)?
   \[ \checkmark \text{Yes} \quad \square \text{No} \]

2. **Suitability of the local research environment**
   a) Are all the resources (other than funding that is conditional on ethical approval) and/or facilities that the study requires appropriate and available (for example, is staffing adequate? Is this site accessible for mobility-impaired people where necessary)?
   \[ \checkmark \text{Yes} \quad \square \text{No} \]
   b) Have all potentially affected managers of resources such as patient records or laboratory managers been notified?
   \[ \checkmark \text{Yes} \quad \square \text{No} \]

3. **Have issues such as cultural issues specific to this locality or to people being recruited at this locality been addressed?**
   \[ \checkmark \text{Yes} \quad \square \text{No} \]

4. **Have the local investigator contact details and other important contact details been provided to the locality organisation for checking?**
   \[ \checkmark \text{Yes} \quad \square \text{No} \]

Part Three: Declaration by locality organisation

I am authorised to complete locality approval on behalf of this locality organisation. I understand that I may withdraw locality approval if any significant local concerns arise. I agree to advise the principal investigator and then the relevant ethics committee should this occur.

(Questions 1–4 at Part Two above must be completed prior to signing.)

I confirm the organisation has sufficient indemnity insurance to compensate participants for harm that does not qualify for compensation under the Injury Prevention, Rehabilitation and Compensation Act 2001.

Signature: [Signature]
Date: 15/5/2012

Name: Emeritus Professor Linda Holloway
Position: HOD Human Nutrition

Contact details: Email linda.holloway@otago.ac.nz or a.morrison@otago.ac.nz
Tel: +64 3 479 7959
FAX: +64 3 479 7958
PARTICIPANT SELF-SCREENING FORM:
The NEEDNT Food List Moderation Guidelines Pretest Study

Date:

Full name:

Home address:

Phone numbers:

Preferred email:

Date of birth:
Age:

GP name:

GP contact details:

Current height and weight
Height:
Weight:

Current BMI only if known:

What do you recall your highest adult weight to be?
What do you recall your lowest adult weight to be?

Are you currently wanting to lose weight? Yes / No / Maybe

The NEEDNT Food List Moderation Guidelines Pretest Study – Self Screening Form V2 10/11/12

Department of Human Nutrition
University of Otago
PO Box 56 Dunedin
New Zealand

Telephone: +64 3 479 4856
FAX: +64 3 479 7958
Email: needntfoodlist@otago.ac.nz
Have you attempted to lose weight in the past and been unsuccessful? Yes / No
(by unsuccessful we mean either you were not able to lose the weight you wanted or
you eventually regained some/all of the weight you lost).

**If yes:**
Please briefly describe the methods or programmes you have used to try and lose weight:

Please tell us why you think the methods or programmes you used above were not
successful in assisting you to lose weight and/or keep it off:

Have you lost weight in the previous 6 months? Yes / No

**If yes:**
How much weight did you lose? (in kg or lb):

How much, if any, of this have you since regained? (in kg or lb):
Have you at any time been diagnosed with an eating disorder or have you been told by a health professional that you may have an eating disorder, such as Anorexia or Bulimia Nervosa, Eating Disorder Not Otherwise Specified, Binge Eating Disorder or Disordered Eating? Yes / No

If yes please specify & add comments if you wish:

Do you have any physical illnesses or medical conditions which are managed by yourself and/or your GP? Examples might be Type 1 or 2 Diabetes, Hypertension, etc

Please list:

Are you currently taking any of the following classes of medications:
Insulin, steroids, antipsychotic medications, or weight loss medications?

If yes:
Please specify which types/brands by circling from the following options or writing in the space below:

1. Tenuta Dospan
2. Duromine
3. Umene
4. Reductil
5. Xenical
6. Apo-prednisone
7. Betnesol
8. Cortisone
9. Dexamethesone
10. Enotecort
11. Medrol
12. Prednisone
13. Prednisolone
14. Florinol
15. Hydrocortisone
16. Metformin
17. Glucomet
18. Glucophage
19. Metomin
20. Gilbenlamide
21. Daonil
22. Diamicron
23. Diatol
24. Gilben
25. Glipid
26. semi-Daonil
27. Insulin

The NEEDNT Food List Moderation Guidelines Pretest Study – Self Screening Form V2 10/11/12

Department of Human Nutrition
University of Otago
PO Box 56 Dunedin
New Zealand

Telephone: +64 3 479 4856
FAX: +64 3 479 7958
Email: neednfoodlist@otago.ac.nz
If you are selected to be part of this study would you consent for us to have full communication with your GP if required? Yes / No

**Female participants only thank you:**
Is there any possibility that you might be pregnant at the moment? Yes / No

**Female participants only thank you:**
Are you trying to become pregnant within the next 6-weeks or are you currently breastfeeding? Yes / No

---

**Thankyou for taking the time to fill this in!**

I will be in contact with you as soon as I can to let you know if this study is suitable for you & talk about what to do next 🎉

Thanks,
Renee
027 920 1313

---

The NEEDNT Food List Moderation Guidelines Pretest Study – Self Screening Form V2 10/11/12

Department of Human Nutrition
University of Otago
PO Box 56 Dunedin
New Zealand

Telephone: +64 3 479 4856
FAX: +64 3 479 7958
Email: needntfoodlist@otago.ac.nz
Appendix I: Ethnicity form

Department of Human Nutrition  
University of Otago, Dunedin, New Zealand

**PARTICIPANT ETHNICITY FORM:**

The NEEDNT Food List Moderation Guidelines Pretest Study

<table>
<thead>
<tr>
<th>Ethnic Group</th>
<th>Yes/No/Other Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ European</td>
<td>1. Yes</td>
</tr>
<tr>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td>Māori</td>
<td>1. Yes (If YES go to Q2)</td>
</tr>
<tr>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td>Samoan</td>
<td>1. Yes</td>
</tr>
<tr>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td>Cook Island Māori</td>
<td>1. Yes</td>
</tr>
<tr>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td>Tongan</td>
<td>1. Yes</td>
</tr>
<tr>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td>Niuean</td>
<td>1. Yes</td>
</tr>
<tr>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td>Chinese</td>
<td>1. Yes</td>
</tr>
<tr>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td>Indian</td>
<td>1. Yes</td>
</tr>
<tr>
<td></td>
<td>2. No</td>
</tr>
<tr>
<td>Other (such as Dutch, Japanese, etc.)</td>
<td>Tokelauan</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If of Māori descent do you know the name of your iwi (tribe or tribes)?

If YES, specify iwi: __________________________

<table>
<thead>
<tr>
<th>Signature:</th>
<th>Dated:</th>
</tr>
</thead>
</table>

The NEEDNT Food List Moderation Guidelines Pretest Study – Participant Ethnicity Form V1 10/01/13

Department of Human Nutrition  
University of Otago  
PO Box 56 Dunedin  
New Zealand

Telephone: +64 3 479 4856  
FAX: +64 3 479 7958  
Email: needntfoodlist@otago.ac.nz
Where can I get more information about the study?
Renee Graham may be contacted on the following numbers or email below. Please feel free to leave a voice message or text message on her cell phone, or a message with her office colleagues, and she will get back to you as soon as possible:

**Study Researcher: Renée Graham**
Department of Human Nutrition
University of Otago, Dunedin
PO Box 56
Dunedin, 9054
- **Phone or text:** 027 920 1313 (study cell) or 027 363 3977 (personal cell)
- **Email** needntfoodlist@otago.ac.nz

**Principal Investigator: Dr Jane Elmslie**
**Co-Investigator: Dr Ria Schroder**
Research Fellows
National Addiction Centre
Department of Psychological Medicine
University of Otago, Christchurch,
PO Box 4345
Christchurch Mail Centre
Christchurch 8140
Ph. (03) 364 0480
Fax (03) 364 1255
Email jane.elmslie@otago.ac.nz; ria.schroder@otago.ac.nz

**Ethics Ref: LRS/12/05/010**
Appendix J: Ethics committee response

17 May 2012

Dr Jane Elmslie  
University of Otago - Christchurch School of Medicine  
Department of Psychological Medicine  
Christchurch School of Medicine  
P O Box 4345  
Christchurch

Dear Dr Elmslie

Ethics ref: LRS/12/05/010 (please quote in all correspondence)  
Study title: Development and Pilot Evaluation of NEEDNT Foods List Moderation Guidelines  
Investigators: Dr Jane Elmslie, Dr Ria Schroder, Ms Renee Graham

The Lower South Regional Ethics Committee considered your study on 15 May 2012 and approved it subject to the following conditions.

**Missing Documentation:**

Please provide the following:

- Maori consultation  
- Locality Assessment for University of Otago

**Participant Information Sheet/Consent Requirements:**

- Please reword the reference being pregnant in the consent form.  
- The committee request a copy of the moderation guidelines when they are completed.  
- Please change the consent form YES/NO to tick boxes.

**You may not proceed with your study until ethical approval has been given.** In order to obtain ethical approval from the Committee, please forward evidence that the above conditions have been met, with one copy of amended documentation, including:

- amended pages of the National Application Form  
- a full copy of the amended information sheet/consent form/questionnaire etc with updated version number and date.
Provided the conditions above have been met, final approval for your study will be given by the Chairperson of the Committee. You will receive a letter advising you that final approval has been given, and may then proceed with your study.

Please don’t hesitate to contact me for further information.

Yours sincerely

AWHINA RANGIWAI
ADMINISTRATOR
Lower South Regional Ethics Committee
Appendix K: Reply to ethics committee

National Addiction Centre
(Aotearoa New Zealand)

October 17th, 2012

Lower South Regional Ethics Committee
c/- Ministry of Health
PO Box 5013
1 the Terrace
Wellington

Dear Awhina,

RE: LRS/12/05/010
Study title: Development and Pilot Evaluation of NEEDT Foods List Moderation Guidelines
Investigators: Dr Jane Elmslie, Dr Ria Schroder, Ms Renee Graham

Thank you very much for you letter dated 17 May 2012. We have addressed all the points raised by the ethics committee members and our responses to these are listed in detail on the attached sheet.

Please also find enclosed our revised Information sheet, documentation relating to Maori Consultation, a Locality Assessment for the University of Otago and the revised National Application form.

In addition, we would like to request permission to add an interim pretesting phase to the study. This phase will involve a separate qualitative study to explore the acceptability and usability of the NEEDT Food List Moderation guidelines in 10 people with obesity (potential users of the guidelines) prior to progressing to the pilot study (to which the current ethical approval applies). We have included a separate information sheet and consent form for this interim pretesting phase of the study, which has been titled ‘Development and Pretesting of NEEDT Foods List Moderation Guidelines’.

I look forward to hearing from you.

Yours sincerely

Dr Jane Elmslie
Point 1: The aim of this study is to evaluate whether the NEEDNT Food List Moderation guidelines assist people with obesity to lose weight. Because weight gain is a natural consequence of pregnancy we have listed being pregnant or intending to become pregnant in our exclusion criteria. Omitting this criterion would weaken the study design and confound the study outcome. For this reason we have not changed the wording of the statement “I understand that I cannot be pregnant or should not be trying to get pregnant while being involved in this study.”

Point 2: The moderation guidelines are attached.

Point 3: We have changed the consent form YES/NO to tick boxes.
Appendix L: Ethical approval

2 November 2012

Dr Jane Elmslie
University of Otago - Christchurch School of Medicine
Department of Psychological Medicine
Christchurch School of Medicine
P.O. Box 4345
Christchurch

Dear Dr Elmslie

<table>
<thead>
<tr>
<th>Re:</th>
<th>Ethics ref:</th>
<th>LRS/12/05/010 (please quote in all correspondence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study title:</td>
<td>Development and Pilot Evaluation of NEEDNT Foods List Moderation Guidelines</td>
<td></td>
</tr>
</tbody>
</table>

I am pleased to advise that this application has been approved by the Southern Health and Disability Ethics Committee.

Conditions of HDEC approval

HDEC approval for this study is subject to the following conditions being met prior to the commencement of the study in New Zealand. It is your responsibility, and that of the study’s sponsor, to ensure that these conditions are met. No further review by the Southern Health and Disability Ethics Committee is required.

Standard conditions:

1. Before the study commences at any locality in New Zealand, all relevant regulatory approvals must be obtained.

2. Before the study commences at a given locality in New Zealand, it must be authorised by that locality, and this authorisation recorded as soon as possible in Online Forms. Locality authorisation confirms that the locality is suitable for the safe and effective conduct of the study, and that local research governance issues have been addressed.

After HDEC review

Please refer to the Standard Operating Procedures for Health and Disability Ethics Committees (available on www.ethics.health.govt.nz) for HDEC requirements relating to amendments and other post-approval processes.

The Southern Health and Disability Ethics Committee is satisfied that your study is not a clinical trial that is to be conducted principally for the benefit of the manufacturer or distributor of the medicine or item being trialled. Participants injured as a result of treatment received as part of
your study may therefore be eligible for publicly-funded compensation through the Accident Compensation Corporation (ACC).

Please don’t hesitate to contact the HDEC secretariat for further information. We wish you all the best for your study.

Yours sincerely,

[Signature]

Raewyn Idoine
Chairperson
Southern Health and Disability Ethics Committee

Encl:  appendix A: documents submitted
       appendix B: statement of compliance and list of members
### Appendix A
#### Documents submitted

<table>
<thead>
<tr>
<th>Document</th>
<th>Version number</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Application Form</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part 4 signed by Dr Jane Elmslie</td>
<td></td>
<td>1 May 2012</td>
</tr>
<tr>
<td>Study Protocol</td>
<td>Version 1</td>
<td>29 April 2012</td>
</tr>
<tr>
<td>Advertisement</td>
<td>Version 1</td>
<td>29 April 2012</td>
</tr>
<tr>
<td>Telephone Screening Form</td>
<td>Version 1</td>
<td>29 April 2012</td>
</tr>
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<td>Patient Consent Form</td>
<td>Version 1</td>
<td>29 April 2012</td>
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<tr>
<td>Participant Information Sheet</td>
<td>Version 1</td>
<td>29 April 2012</td>
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<tr>
<td>Temperament and Character Inventory</td>
<td>Version 1</td>
<td>29 April 2012</td>
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<td>7 Day Diet Record</td>
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<td>Dutch Eating Behaviour Questionnaire</td>
<td>Version 1</td>
<td>29 April 2012</td>
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<td>Eating Disorder Examination Questionnaire</td>
<td>Version 1</td>
<td>29 April 2012</td>
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<tr>
<td>Three Factor Eating Questionnaire</td>
<td>Version 1</td>
<td>29 April 2012</td>
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<tr>
<td>Week 12 Participant Questionnaire</td>
<td>Version 1</td>
<td>29 April 2012</td>
</tr>
<tr>
<td>The NEEDT Food List NZMJ</td>
<td></td>
<td>24 Feb 2012</td>
</tr>
<tr>
<td>Cover letter signed by Dr Jane Elmslie</td>
<td></td>
<td>17 October 2012</td>
</tr>
<tr>
<td>The NEEDT Food List Moderation Guidelines Pretest Study Advertisement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The NEEDT Food List Moderation Guidelines Pretest Study - Week four interview</td>
<td>Version 2</td>
<td>16 October 2012</td>
</tr>
<tr>
<td>The NEEDT Food List Moderation Guidelines Pretest Study - Participant Information Sheet and Consent Form</td>
<td>Version 3</td>
<td>5 October 2012</td>
</tr>
<tr>
<td>The NEEDT Food List Moderation Guidelines Pilot Study - Study Protocol</td>
<td>Version 3</td>
<td>18 October 2012</td>
</tr>
<tr>
<td>The NEEDT Food List Moderation Guidelines Pilot Study - Participant Information Sheet and Consent Form</td>
<td>Version 2</td>
<td>31 July 2012</td>
</tr>
<tr>
<td>The NEEDT Food List Moderation Guidelines Pilot Study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The NEEDT Food List Moderation Guidelines Revised National Application Form</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence of Maori Consultation - letter from Ngai Tahu Research Consultation Committee</td>
<td></td>
<td>21 August 2012</td>
</tr>
<tr>
<td>Signed Locality Assessment for the University of Otago</td>
<td></td>
<td>15 May 2012</td>
</tr>
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</table>
Appendix B
Statement of compliance and list of members

Statement of compliance

The Southern Health and Disability Ethics Committee:

— is constituted in accordance with its Terms of Reference
— operates in accordance with the Standard Operating Procedures for Health and Disability Ethics Committees, and with the principles of international good clinical practice (GCP)
— is approved by the Health Research Council of New Zealand’s Ethics Committee for the purposes of section 25(1)(c) of the Health Research Council Act 1990
— is registered (number 00008713) with the US Department of Health and Human Services’ Office for Human Research Protection (OHRP).

List of members

<table>
<thead>
<tr>
<th>Name</th>
<th>Category</th>
<th>Appointed</th>
<th>Term Expires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ms Raewyn Idoine</td>
<td>Lay (consumer/community perspectives)</td>
<td>01/07/2012</td>
<td>01/07/2015</td>
</tr>
<tr>
<td>Mr Doug Bailey</td>
<td>Lay (the law)</td>
<td>01/07/2012</td>
<td>01/07/2015</td>
</tr>
<tr>
<td>Mrs Angelika Frank-Alexander</td>
<td>Lay (consumer/community perspectives)</td>
<td>01/07/2012</td>
<td>01/07/2014</td>
</tr>
<tr>
<td>Dr Sarah Gunningham</td>
<td>Non-lay (intervention studies)</td>
<td>01/07/2012</td>
<td>01/07/2015</td>
</tr>
<tr>
<td>Ms Gwen Neave</td>
<td>Lay (consumer/community perspectives)</td>
<td>01/07/2012</td>
<td>01/07/2014</td>
</tr>
<tr>
<td>Dr Nicola Swain</td>
<td>Non-lay (observational studies)</td>
<td>01/07/2012</td>
<td>01/07/2014</td>
</tr>
<tr>
<td>Dr Martin Than</td>
<td>Non-lay (intervention studies)</td>
<td>01/07/2012</td>
<td>01/07/2014</td>
</tr>
<tr>
<td>Dr Mathew Zacharias</td>
<td>Non-lay (health/disability service provision)</td>
<td>01/07/2012</td>
<td>01/07/2015</td>
</tr>
</tbody>
</table>

http://www.ethics.health.govt.nz
Appendix M. The NEEDNT Food List paper

The NEEDNT Food List: non-essential, energy-dense, nutritionally-deficient foods

Jane L Elmslie, J Douglas Sellman, Ria N Schroder, Frances A Carter

Abstract

Aim To provide a list of non-essential, energy-dense, nutritionally-deficient foods in New Zealand (NEEDNT foods) which are usually high in calories and either bereft of nutritional benefits or easily replaced with lower calorie, more nutritious alternatives.

Methods The List was compiled using the National Heart Foundation and Diabetes New Zealand “Foods to Avoid”, “Stop Eating” and “Optional Foods” lists and the Canterbury District Health Board “Supermarket Shopping Guide”. Foods and beverages were included if they contained alcohol, saturated fat, added sugar, were prepared using a high fat cooking method or contained a large amount of energy relative to their essential nutrient value. As it has no energy value, salt was not a criterion for inclusion on the List.

Results Over 50 potential foods or groups of foods were identified that contained alcohol, saturated fat, added sugar, were prepared using a high fat cooking method or contained a large amount of energy relative to their essential nutrient value. Fifty foods/groups of foods were included on the final list (Table 1).

Conclusions The NEEDNT Food List will be a useful tool for medical practitioners and other health professionals working with people wanting to lose weight.

Obesity results when energy intake exceeds expenditure. However, the relative importance of the many factors that contribute to energy balance continues to be the subject of considerable debate.\(^1\)\(^2\) Most researchers and clinicians agree, however, that reduction of energy intake (eating fewer calories/kilojoules) is a vital component of weight management.\(^3\)\(^4\) Furthermore, humans did not evolve to eat a highly processed diet\(^5\) and the benefits of consuming less processed diets, high in naturally occurring micronutrients, such as the Mediterranean diet or that used in the Diabetes Prevention Programme, are very clear.\(^5\)\(^6\)

Advising obese patients to “eat moderately,” “eat a balanced diet,” “reduce fat and sugar” or “eat fewer calories” seems sensible. However, the complexity of the modern food supply and the widespread availability of various types of energy-dense (high calorie) foods, low in essential nutrients, makes it difficult to provide simple, clear information about what and how much to eat. Excessive consumption of such foods reduces overall diet quality, and frequently results in inadequate intakes of essential nutrients, while adding considerably to energy intake.\(^7\)\(^8\)\(^9\)

Many processed foods, for example muesli/granola bars, are marketed as ‘healthy’, but while they may contain fruit and nuts, they are also high in fat and sugar, and are essentially just another form of biscuit/cookie. However, in the public mind, ‘healthy’ is often equated with ‘not fattening.’
In practice, patients frequently believe they will lose weight by replacing a biscuit with a muesli bar or soft [soda, fizzy, carbonated] drink with fruit juice, in effect substituting one energy-dense food for another. They are usually surprised to learn that ‘healthy’ muesli bars can contain almost twice as many calories as one Toffee Pop® [chocolate coated] biscuit.13

Misleading or irrelevant nutritional claims further blur the distinction between healthy and energy-dense, nutritionally-deficient foods. Examples include labelling high sugar foods ‘low fat’ or implying that a food is ‘healthy’ merely because it has some ‘natural’ or ‘organic’ ingredients. Even foods that have received nutritional endorsements such as the Heart Foundation Tick may just be the best options in a category of typically high calorie food products such as oven chips, pies or ice cream. Consumers often do not understand these subtleties.12

Various countries have attempted to make the distinction between nutrient rich, and energy-dense, nutritionally-deficient foods clearer to consumers. The United States (US) Dietary Guidelines distinguish between “discretionary calories” (from saturated fat, added sugars and alcohol) and calories found in foods rich in essential nutrients.13 However, US food manufacturers are not currently required to clearly stipulate the proportion of discretionary calories on food labels, although consumers can derive this information from the food label provided if they are sufficiently numerate and motivated to do so.14,15

Both Food Standards Australia and New Zealand16 and the United Kingdom (UK) Food Standards Agency17 have recommended “Traffic Light”, front of pack labelling for foods to provide clarity over which foods form the basis of a healthy diet. This system uses red, amber or green, front of pack colour coding (traffic lights) to indicate, whether levels of total and saturated fat, sugar and salt are high, medium or low per 100 g/ml. This allows consumers to judge at a glance, the relative dietary merits of the foods they are considering purchasing. Perhaps not surprisingly, the food industry has reacted negatively to this system and is vigorously lobbying governments to prevent its mandatory introduction.18

Currently, New Zealand does not require food to be labelled using this system, although its voluntary introduction has been recommended by a joint Australian and New Zealand review of food labelling law and policy.16 Instead consumers are required to make complex decisions, often requiring a sophisticated understanding of nutrition and food composition to eat healthily. In such a complex landscape, clinicians may struggle to provide patients with meaningful weight control advice and support.

The need for disease-specific dietary education materials for patients with comorbidities such as diabetes and cardiovascular disease can make this task even more difficult. Simple, unambiguous patient education materials may make it easier to provide nutritional messages while at the same time maintaining patients’ motivation to change.

The present paper aims to provide a list of non-essential, energy-dense, nutritionally-deficient foods (NEEDNT foods). This is not simply another list of high calorie foods. This is a list of foods which are usually high in calories and either bereft of nutritional benefits or easily replaced with a lower calorie, more nutritious alternative. It is hoped...
that this list will be a simple tool to help adult patients differentiate foods required for
good health, from those that are non-essential, energy-dense, and nutritionally
deficient. It is intended that this list will be used by medical practitioners and other
health professionals working with adults who are overweight or obese, who want to
lose weight.

Methods
The NEEDNT Food List was compiled using the National Heart Foundation and Diabetes New
Zealand “Foods to Avoid”, “Stop Eating” and “Optional Foods” lists,19-21 the Canterbury District
Health Board “Supermarket Shopping Guide” 22 and the USDA population guidance on discretionary
calories. 23 Foods and beverages were included if they contained alcohol, saturated fat, added sugar,
were prepared using a high fat cooking method or contained a large amount of energy relative to their
essential nutrient value. As it has no energy value, salt was not a criterion for inclusion on the List.

Results
More than 50 potential foods or groups of foods, such as desserts and takeaway foods
were identified that contained alcohol, saturated fat, added sugar, were prepared using
a high fat cooking method or contained a large amount of energy relative to their
essential nutrient value. Following discussions with current research patients
undergoing obesity treatment and obesity treatment colleagues, the List was finalised
as an arrangement of 50 foods/groups of foods. Many of the identified foods are high
in salt as well as energy. Tables 1 and 2 show the NEEDNT Food List organised
alphabetically and for easy reference, in groups according to potential uses. Suitable
alternative foods are provided where possible.

Discussion
The present paper aims to provide clinicians and patients with a clear unambiguous
list of non-essential energy-dense, nutritionally-deficient foods. This is not simply
another list of high calorie foods. This is a list of foods that are usually high in
calories and either bereft of nutritional benefits or easily replaced with lower calorie,
more nutritious alternatives. The List is intended as a simple tool to help medical
practitioners and other health professionals initiate conversations about food
consumption patterns which may promote and maintain obesity and to increase
patients’ awareness of the relative energy and nutrient densities of many commonly
consumed foods.

The purpose of the NEEDNT Food List is to clearly distinguish empty calorie,
nutrient poor foods from which it is possible to safely abstain without adverse
nutritional consequences. All foods with high energy density relative to essential
nutrient content are included on the NEEDNT Food List. For the most part
distinctions between foods that require users to read food labels are avoided but this
was not possible in some cases, such as breakfast cereals and crackers. To avoid
confusion, the List does not distinguish between “red” and “amber” foods.

Many amber foods are energy-dense and relatively low in essential nutrients, just not
to quite the same degree as “red” foods. For example, fruit juice is on the NEEDNT
Food List because while it contains more essential nutrients than soft drink, its sugar
content is similar; it is easily consumed in large amounts and it is much higher in
energy and lower in essential nutrients than whole fruit.
Table 1. Non-essential energy-dense nutritionally-deficient (NEEDNT) foods and their lower calorie replacements

<table>
<thead>
<tr>
<th>NEEDNT food</th>
<th>Replace with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcoholic drinks</td>
<td>Water/diet soft drinks</td>
</tr>
<tr>
<td>Biscuits</td>
<td>*</td>
</tr>
<tr>
<td>Butter, lard, dripping or similar fat (used as a spread or in baking/cooking etc.)</td>
<td>Lite margarine or similar spread or omit</td>
</tr>
<tr>
<td>Cakes</td>
<td>*</td>
</tr>
<tr>
<td>Chocolate</td>
<td>*</td>
</tr>
<tr>
<td>Coconut cream</td>
<td>Lite coconut milk/coconut-flavoured lite evaporated milk</td>
</tr>
<tr>
<td>Condensed milk</td>
<td>*</td>
</tr>
<tr>
<td>Cordial</td>
<td>Water/sugar-free cordial</td>
</tr>
<tr>
<td>Corn chips</td>
<td>*</td>
</tr>
<tr>
<td>Cream (including crème fraiche)</td>
<td>Natural yoghurt (or flavoured yoghurt depending on use)</td>
</tr>
<tr>
<td>Crisps (including vegetable crisps)</td>
<td>*</td>
</tr>
<tr>
<td>Desserts/puddings</td>
<td>*</td>
</tr>
<tr>
<td>Doughnuts</td>
<td>*</td>
</tr>
<tr>
<td>Drinking chocolate, Milo® etc.</td>
<td>Cocoa plus artificial sweetener</td>
</tr>
<tr>
<td>Energy drinks</td>
<td>Water</td>
</tr>
<tr>
<td>Flavoured milk/milkshakes</td>
<td>Trim, calc-firm or lite blue (cap) milk</td>
</tr>
<tr>
<td>Fruit tinned in syrup (even lite syrup!)</td>
<td>Fruit tinned in juice/artificially sweetened</td>
</tr>
<tr>
<td>Fried food</td>
<td>Boiled, grilled or baked food</td>
</tr>
<tr>
<td>Frozen yoghurt</td>
<td>Ordinary yoghurt</td>
</tr>
<tr>
<td>Fruit juice (except tomato juice and unsweetened blackcurrant juice)</td>
<td>Fresh fruit (apple, orange, pear etc. + a drink of water)</td>
</tr>
<tr>
<td>Glucose</td>
<td>Artificial sweetener</td>
</tr>
<tr>
<td>High fat crackers (≥10g fat per 100g)</td>
<td>Lower fat crackers (≤ 10g fat per 100g)</td>
</tr>
<tr>
<td>Honey</td>
<td>*</td>
</tr>
<tr>
<td>Hot chips</td>
<td>*</td>
</tr>
<tr>
<td>Ice cream</td>
<td>*</td>
</tr>
<tr>
<td>Jam</td>
<td>*</td>
</tr>
<tr>
<td>Marmalade</td>
<td>*</td>
</tr>
<tr>
<td>Mayonnaise</td>
<td>Lite dressings/lite mayonnaise</td>
</tr>
<tr>
<td>Muesli/granola bars</td>
<td>*</td>
</tr>
<tr>
<td>Muffins</td>
<td>*</td>
</tr>
<tr>
<td>Nuts roasted in fat or oil</td>
<td>Dry roasted or raw nuts (≤1 handful per day)</td>
</tr>
<tr>
<td>Pastries</td>
<td>*</td>
</tr>
<tr>
<td>Pies</td>
<td>*</td>
</tr>
<tr>
<td>Popcorn with butter or oil</td>
<td>Air popped popcorn</td>
</tr>
<tr>
<td>Quiches</td>
<td>Crust-less quiches</td>
</tr>
<tr>
<td>Reduced cream</td>
<td>Natural yoghurt</td>
</tr>
<tr>
<td>Regular luncheon sausage</td>
<td>Low fat luncheon sausage</td>
</tr>
<tr>
<td>Regular powdered drinks (e.g. Raro®)</td>
<td>Water/diet/margarine-free powdered drinks</td>
</tr>
<tr>
<td>Regular salami</td>
<td>Low fat salami</td>
</tr>
<tr>
<td>Regular sausages</td>
<td>Low fat sausages</td>
</tr>
<tr>
<td>Regular soft drinks</td>
<td>Water/diet soft drinks</td>
</tr>
<tr>
<td>Rollups</td>
<td>Fresh fruit</td>
</tr>
<tr>
<td>Sour cream</td>
<td>Natural yoghurt</td>
</tr>
<tr>
<td>Sugar (added to anything including drinks, baking, cooking etc.)</td>
<td>Artificial sweetener</td>
</tr>
</tbody>
</table>
Whole milk is on the List because while it is a valuable source of essential nutrients (such as calcium and protein) it is also a significant source of energy and saturated fat. It can be easily replaced by low fat milk, which is higher in calcium and protein, without any detrimental effect on overall nutrition, except in the very young. However, high calorie unprocessed foods such as plant oils, avocados, hard cheeses and dry roasted or unroasted nuts were categorised as nutritious because these foods are valuable sources of essential nutrients despite their relatively high energy content. This categorisation is deliberately different from most “traffic light systems” intended for population dietary guidance, which place nutrient-dense, energy-dense foods such as cheese and plant oil spreads in the amber category because of their high energy and/or saturated fat content.12,33

The NEEDNT Food List is similar to proposed Front of Pack Traffic Light Labelling schemes in that it clearly identifies foods that are high in empty calories and low in essential nutrients. However, the List is not intended to give consumers specific information about the relative fat, sugar and salt content of different products in the same way as Front of Pack Traffic Light Labelling or programmes such as “Pick the Tick”.24 Instead it provides a clear framework for conversations about eating for weight control that does not require a sophisticated knowledge of nutrition or food composition.

To discourage patients from thinking about their eating in morally judgemental terms such “good” and “bad” or “naughty” without understanding the reasons for these distinctions, categorising foods as healthy or unhealthy has been deliberately avoided and the more accurate and objective terms, energy-dense and non-essential have been used instead to highlight the fact that these foods can be safely avoided without compromising nutritional status, while promoting weight loss.

While we are conscious that simply advising avoidance of NEEDNT foods is unlikely to be an effective obesity treatment strategy on its own, it is increasingly clear that in most western countries such foods constitute a large proportion of the total foods consumed and play an increasingly important role in the maintenance of dietary energy surpluses.25,26 Major social change will be required to reduce the prevalence of obesity at a population level. In the meantime we need to ensure that the available treatment options meet the needs of individual patients.27

We are currently evaluating the utility of the NEEDNT Food List for weight control. The List can help patients become aware of their unnecessary or recreational energy consumption and enable them to prioritise dietary changes accordingly. Recognising the distinction between NEEDNT and nutritious foods can help patients to think about
their eating differently. It is envisaged that the List will be given to adults who are obese or overweight, who want to lose weight, and who do not have a current or past history of eating disorders involving restriction and/or binge eating.

Table 2. Non-essential energy-dense nutritionally-deficient foods by group

<table>
<thead>
<tr>
<th>Foods by group/use</th>
<th>Replace with:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beverages</strong></td>
<td></td>
</tr>
<tr>
<td>Alcoholic drinks</td>
<td>Water/diet soft drinks</td>
</tr>
<tr>
<td>Cordial</td>
<td>Water/Sugar-free cordial</td>
</tr>
<tr>
<td>Drinking chocolate, Milo® etc.</td>
<td>Cocoa plus low-fat milk and artificial sweetener/Lite drinking chocolate</td>
</tr>
<tr>
<td>Energy drinks</td>
<td>Water</td>
</tr>
<tr>
<td>Flavoured milk/milkshakes</td>
<td>Trim, calci-trim or Lite Blue [caps] milk</td>
</tr>
<tr>
<td>Fruit juice (except tomato juice and unsweetened blackcurrant juice)</td>
<td>Fresh fruit (apple, orange, pear etc. + a drink?)</td>
</tr>
<tr>
<td>Regular powdered drinks (e.g. Raro®)</td>
<td>Water/Diet/Sugar-free powdered drinks</td>
</tr>
<tr>
<td>Regular soft drinks</td>
<td>Water/Diet soft drinks</td>
</tr>
<tr>
<td>Whole Milk</td>
<td>Trim, calci-trim or Lite Blue [caps] milk</td>
</tr>
<tr>
<td><strong>Biscuits/cakes</strong></td>
<td>*</td>
</tr>
<tr>
<td>Muffins</td>
<td>*</td>
</tr>
<tr>
<td>Muesli bars</td>
<td>*</td>
</tr>
<tr>
<td><strong>Breakfast cereals</strong></td>
<td>Any breakfast cereal with ≤15g sugar per 100g cereal, ≥6g fibre per 100g cereal and ≤5g fat per 100g cereal (or ≤10g fat per 100g cereal if cereal contains nuts and seeds)</td>
</tr>
<tr>
<td>Toasted muesli and any other breakfast cereal with ≥15g sugar per 100g cereal</td>
<td>Yoghurt (not more than one a day)</td>
</tr>
<tr>
<td>Whole Milk</td>
<td>Trim, calci-trim or Lite Blue [caps] milk</td>
</tr>
<tr>
<td><strong>Dairy products</strong></td>
<td></td>
</tr>
<tr>
<td>Yoghurt type products with ≥10g sugar per 100g yoghurt</td>
<td>*</td>
</tr>
<tr>
<td>Yoghurt (not more than one a day)</td>
<td>*</td>
</tr>
<tr>
<td>Whole Milk</td>
<td>*</td>
</tr>
<tr>
<td><strong>Deserts/puddings</strong></td>
<td></td>
</tr>
<tr>
<td>Ice cream</td>
<td>*</td>
</tr>
<tr>
<td>Frozen yoghurt</td>
<td>Ordinary yoghurt</td>
</tr>
<tr>
<td><strong>Fats</strong></td>
<td></td>
</tr>
<tr>
<td>Butter, lard, dripping or similar hard fat (used as a spread or in baking/cooking etc.)</td>
<td>Lite margarine or similar spread or omit</td>
</tr>
<tr>
<td>Coconut cream</td>
<td>Lite coconut milk/coconut flavoured lite evaporated milk</td>
</tr>
<tr>
<td>Cream (including crème fraîche)</td>
<td>Natural yoghurt (or flavoured yoghurt depending on use)</td>
</tr>
<tr>
<td>Mayonnaise</td>
<td>Lite dressings/lite mayonnaise</td>
</tr>
<tr>
<td>Reduced cream</td>
<td>Natural yoghurt</td>
</tr>
<tr>
<td>Sour Cream</td>
<td>*</td>
</tr>
<tr>
<td><strong>Fried foods</strong></td>
<td></td>
</tr>
<tr>
<td>Doughnuts</td>
<td>Baked, grilled or baked food</td>
</tr>
<tr>
<td>Hot chips</td>
<td>*</td>
</tr>
<tr>
<td><strong>Fruit</strong></td>
<td></td>
</tr>
<tr>
<td>Fruit tinned in syrup (even lite syrup!)</td>
<td>Fruit tinned in juice/artificially sweetened</td>
</tr>
<tr>
<td>Roll-Ups®</td>
<td>Fresh fruit</td>
</tr>
<tr>
<td><strong>Meats</strong></td>
<td></td>
</tr>
<tr>
<td>Regular luncheon sausage (or other processed meat)</td>
<td>Low fat luncheon sausage (or other processed meat)</td>
</tr>
<tr>
<td>Regular salami</td>
<td>Low fat salami</td>
</tr>
<tr>
<td>Regular sausages</td>
<td>Low fat sausages</td>
</tr>
<tr>
<td><strong>Pastries</strong></td>
<td>*</td>
</tr>
<tr>
<td>Pies</td>
<td>*</td>
</tr>
<tr>
<td>Quiches</td>
<td>Crust-less quiches</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td><strong>Snacks</strong></td>
<td></td>
</tr>
<tr>
<td>Corn chips</td>
<td>*</td>
</tr>
<tr>
<td>Crisps (including vegetable crisps)</td>
<td>*</td>
</tr>
<tr>
<td>High fat crackers (≥ 10g fat per 100g)</td>
<td>Lower fat crackers (≤ 10g fat per 100g)</td>
</tr>
<tr>
<td>Nuts roasted in fat or oil</td>
<td>Dry roasted or raw nuts (≤ 1 handful per day)</td>
</tr>
<tr>
<td>Popcorn with butter or oil</td>
<td>Air popped popcorn</td>
</tr>
<tr>
<td><strong>Sugars/sweets</strong></td>
<td></td>
</tr>
<tr>
<td>Chocolate</td>
<td>*</td>
</tr>
<tr>
<td>Condensed milk</td>
<td>Artificial sweetener</td>
</tr>
<tr>
<td>Glucose</td>
<td>*</td>
</tr>
<tr>
<td>Honey</td>
<td>*</td>
</tr>
<tr>
<td>Jam</td>
<td>Artificial sweetener</td>
</tr>
<tr>
<td>Marmalade</td>
<td>*</td>
</tr>
<tr>
<td>Sugar (added to anything including drinks, baking, cooking etc.)</td>
<td>*</td>
</tr>
<tr>
<td>Sweets/softies</td>
<td></td>
</tr>
<tr>
<td>Syrups such as golden syrup, treacle, maple syrup</td>
<td></td>
</tr>
<tr>
<td><strong>Takeaways</strong></td>
<td>*</td>
</tr>
</tbody>
</table>

*No suitable alternative.

The List is also suitable for use in patients with cardiovascular disease and diabetes in conjunction with other disease-specific nutrition education information.

**Conclusion**

Consumption of non-essential energy-dense, nutritionally-deficient foods (NEEDNT foods) undermines patients’ attempts at weight loss, while contributing little in terms of nutrients. Many foods which are marketed as “healthy” are NEEDNT foods. The NEEDNT Food List makes the distinction between nutritious foods and empty calorie foods clear. It is hoped that this List will be a useful tool for medical practitioners and other health professionals working with people wanting to lose weight.

**Competing interests:** None declared.

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**References:**


This article received minor corrections, mostly to Table 1, as per the Erratum published on 30 March 2012 at http://journal.nzma.org.nz/journal/125-1352/S118
Appendix N: NEF calculation method

Standardized calculation method for NEF Values within NEEDNT Foods Moderation Guidelines, using Kai-culator nutritional software

Example of step by step calculation process:

E.g. Food Category: Biscuits
Specific Food Type: Chocolate-coated biscuits

Step 1.
Partially randomised* selection of five biscuits within food category ‘biscuit, chocolate-coated’ as listed in Kai-culator food database:

1) Biscuit, chocolate-coated, mallowpuff: 40 grams (2 biscuits) = 708 kJ
2) Biscuit, chocolate-coated, mint: 30.8 grams (2 biscuits) = 644 kJ
3) Biscuit, chocolate-coated, toffee pop: 34 grams (2 biscuits) = 695 kJ
4) Biscuit, chocolate-base, digestive/wheat: 20.6 grams (2 biscuits) = 392 kJ
5) Biscuit, layered, cream, chocolate-coated: 40 grams (2 biscuits) = 835 kJ

*Included selections at the upper, lower, and mid-range of the caloric spectrum, in order to represent a diverse sample within the specified food category.

Step 2.
Calculate mean energy content per food category: ‘biscuit, chocolate-coated’ based upon five specified selections.

\[
708 + 644 + 695 + 382 + 835 = 3274 \text{ kJ divided by 5 total items} = \\
654.8 \text{ kJ mean energy content per 2 ‘chocolate-coated biscuits’}
\]

Step 3.
Convert kilojoules to calories then convert to corresponding NEF value:

\[
654.8 \text{ kJ divided by 4.186} = 156.4 \text{ calories (rounded to 1 decimal place)} \\
100 \text{ calories} = 1 \text{ NEF Value} \\
\text{Therefore 156.4 calories} = 1.5 \text{ NEFs*} \\
\text{End result: 2 chocolate-coated biscuits equate to 1.5 NEFs}
\]

*NEF Values rounded to nearest 0.5 for ease of use for patients/participants

This standardised method was repeated for 105 individual food category examples, in order to produce NEF values for each individual food within NEEDNT Foods Moderation Guidelines.
Appendix O: Interview questions

The NEEDNT Food List Moderation Guidelines Pretest Study

Week four semi-structured questions for one-hour participant interview:

**Introduction / Icebreaker:** Thank you so much for meeting with me today. What I would like to do is ask you some general questions and to hear about your experiences and thoughts on topics related to this study. Does that sound okay?

1. To start with, tell me about your previous weight loss experiences
   
   **What kinds of approaches have you tried before?**
   
   Further prompts:
   - So what happened when you tried X?
   - Why do you think X happened?
   - You also mentioned trying Y. Tell me a bit more about that.
   - Why do you think these approaches weren’t effective for you long-term?
   
   [Questions aim to ascertain what has and hasn’t worked and why]

   Thanks for sharing that. So now I’d like to hear your views about moderation.

2. Before you took part in this study how would you have described what ‘eating in moderation’ was – for you / in general?
   
   Further prompts:
   - What do you think would happen if you aimed to ‘eat moderately’ in the way you’ve described? How would that go in terms of your weight management?
   - Okay, so you think X would happen. Why do you feel that’s the case for you?
   
   [Questions aim to ascertain participant’s interpretation of ‘moderation’ and whether this is translated into positive eating behaviours]

   So now let’s have a chat about the last four weeks:

3. How have you found using these moderation guidelines?
   
   **What has it been like for you?**
   
   Further prompts:
   - I’m just going to explore that a bit more. What specific parts of the moderation guidelines did you find X?

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Department of Human Nutrition
University of Otago, Dunedin, New Zealand
Q3 continued:
- Why do you think that is?
- What are the pros of using these guidelines?
- What are the cons of using the guidelines?
- What other things do you feel affected your ability to follow these guidelines?

[Questions aim to ascertain whether participant adhered / did not adhere; found it easy / hard; were surprised by food inclusions or omissions; found it logical / intuitive / usable or otherwise; and reasons why]

4. So, tell me about your experience of following these guidelines compared to following X and Y in the past?
Further prompts:
- I’m interested to hear more about that. In what ways did you find X?
- How do you feel about this approach to weight-loss compared to the previous approaches you’ve tried?

[Questions aim to ascertain whether participant found guidelines the same / different / better / worse / restrictive or liberating; and reasons why – compared to previous approaches]

5. How would you say the moderation guidelines have influenced the way you think about your eating?
- Okay, so you think X. What is it about the guidelines that has made you think X now?
- What other eating or lifestyle changes have you made since using these guidelines?
- What other information have you looked into since using these guidelines?

[Questions aim to ascertain whether guidelines have increased dietary awareness and/or information seeking, and whether this translated into other eating changes]

6. What do you think you will do now in terms of future weight management?
- What use will you make of these guidelines?
- How could you see them fitting into your life and your long-term weight-management?
- Tell me the main reasons you think you could/couldn’t follow the guidelines long-term?

[Questions aim to ascertain participant’s view of guidelines as a jump-start or more of a long-term tool, and their barriers for long-term use]
7. What improvements or changes would make the guidelines better for you?
   ➢ That’s a good point. Tell me exactly what you’d like to change about X?
   ➢ What improvements would you like related to the layout & design, and the information included?

   [Questions aim to gather specific feedback about content and design]

   That’s great. Thanks for those pointers. So I have one final question for you:

8. Would you please share with me any other views, concerns, or thoughts you have about the guidelines or about managing your weight in general. Anything that occurs to you is valuable for us to learn about.

   [Questions aim to gain additional feedback not elicited by previous questions]

   Thanks so much for taking the time to talk with me. I will keep in contact to inform you of the study’s progress, and will provide you with a summary of the results when they are ready.

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